Application for Amendment of USNRC Source Materials License SUA-1601, Ross ISR Project

Kendrick Expansion Area, Crook County, Wyoming Docket #40-9091

Environmental Report
Sections 4.0 through 9.0

March 2015

STRATA ENERGY INC
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LIST OF ABBREVIATIONS/ACRONYMS

AADT	Average Annual Daily Traffic
ACL	Alternate Concentration Limit
ACS	American Community Survey
ADT	Average Daily Traffic
AEA	Atomic Energy Act
ALARA	As Low As Reasonably Achievable
AMC	Antecedent Moisture Condition
APE	Area of Potential Effect
APLIC	Avian Power Line Interaction Committee
AQD	Air Quality Division
AQS	Air Quality System
ASLB	Atomic Safety and Licensing Board
ASOS	Automated Surface Observing System
ATV	All-Terrain Vehicle
BACT	Best Available Control Technology
BEA	U.S. Bureau of Economic Analysis
BFH	Basal Fox Hills
BHNF	Black Hills National Forest
BLM	U.S. Bureau of Land Management
BLS	Bureau of Labor Statistics
BMP	Best Management Practices
BNSF	BNSF Railway (formerly Burlington, Northern & Santa Fe)
BPT	Best Practical Technolodgy
BSM	Buckskin Mine
CAA	Clean Air Act
CAB	Commission-Approved Background
CBNG	Coal Bed Natural Gas
CBW	Containment Barrier Wall
CCEMA	Campbell County Emergency Management Agency
CCMH	Campbell County Memorial Hospital
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CGA	Compressed Gas Association
CO	Carbon Monoxide
COOP	Cooperative Observation Program
CR	County Road
CREG	Consensus Revenue Estimating Group
CWA	Clean Water Act
D&D	Decommissioning and Decontamination
DFM	Dry Fork Mine
DHS	The Department of Homeland Security
DM	Deep Monitoring Zone

LIST OF ABBREVIATIONS/ACRONYMS (CONTINUED)

DM&E	Dakota, Minnesota & Eastern Railroad Corporation
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EA	Environmental Assessment
EBM	Eagle Butte Mine
EC	Electrical Conductivity
EHS	Environmental Health and Safety
EIA	U.S. Department of Energy, Energy Information Administration
EIS	Environmental Impact Statement
EMR	Emergency Medical Responder
EMT	Emergency Medical Technician
EO	Executive Order
EOR	Enhanced Oil Recovery
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know
EPS-HDT	Economic Profile System-Human Dimensions Toolkit
ER	Environmental Report
ESA	Endangered Species Act
FCC	Federal Communications Commission
FCR	Fire Cracked Rock
FEMA	Federal Emergency Management Agency
FH	Fox Hills Formation
FONSI	Finding of No Significant Impact
FSA	Farm Service Agency
FSEIS	NRC Staff's Final Supplemental Environmental Impact Statement
GDP	Gross Domestic Product
GER	Generic Environmental Report
GHG	Greenhouse-Gas
GPS	Global Positioning System
GR	Gamma Ray
GSP	Gross State Product
HAP	Hazardous Air Pollutant
HASP	Health and Safety Plan
HDPE	High Density Polyethylene
HEC	Hydrologic Engineering Center
HMS	Hydrologic Modeling System
HPIC	High Pressure Ionization Chamber
HRI	Hydro Resources, Inc.
HUC	Hydrologic Unit Code
IBC	Industrial Building Code
ICS	Incident Command System
IF	Isolated Find

LIST OF ABBREVIATIONS/ACRONYMS (CONTINUED)

IML	Inter-Mountain Laboratories, Inc.
IMPROVE	Interagency Monitoring of Protected Visual Environments
ISC3	Industrial Source Complex
ISI	Industry Specialization Index
ISR	*In-situ* Recovery
ISR GEIS	Generic Environmental Impact Statement for In Situ Leach Uranium Milling Facilities
JFD	Joint Fequency Distribution
KEA	Kendrick Expansion Area
LC	License Condition
LCI	Lost Creek ISR, LLC
LED	Light Emitting Diode
LL	Lower Lance Formation
LLD	Lower Limit of Dectection
LQD	Land Quality Division
LSA	Low-Specific-Activity
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MCL	Maximum Contaminant Level
MDL	Minimum Detection Limit
MET	Meteorological Monitoring Site
MIT	Mechanical Integrity Test
MLC	Middle Lance Clay
MLS	Middle Lance Sand
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPC	Maximum Permissible Concentration
MSHA	Mine Safety & Health Administration
NAAQS	National Ambient Air Quality Standards
NAD	North American Datum
NADP	National Atmospheric Deposition Program
NAICS	North American Industry Classification System
NAIP	National Agriculture Imagery Program
NASS	Nation Agricultural Statistics
NCDC	National Climatic Data Center
NCRP	National Council on Radiation Protection & Measurements
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIOSH	National Institute for Occupational Safety and Health
NMA	National Mining Association
NMSS	Nuclear Material Safety and Safeguards
NO_2	Nitrogen Dioxide

LIST OF ABBREVIATIONS/ACRONYMS (CONTINUED)

NOAA	National Oceanic and Atmospheric Administration
NO_x	Oxides of Nitrogen
NPS	National Park Service
NRC	U.S. Nuclear Regulatory Commission
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
Nubeth	Nubeth Joint Venture
NUREG	Publication Prepared by NRC Staff
NUREG/CR	Publication Prepared by NRC Contracotrs
NWI	National Wetlands Inventory
NWP	Nationwide Permit
NWS	National Weather Service
O_3	Ozone
ODP	Office of Domestic Preparedness
OOEA	Office of Outreach and Environmental Assistance
OSHA	Occupational Safety and Health Administration
OSL	Optical Stimulated Luminescence
OSLI	Office of State Lands and Investments
OSM	Office of Surface Mining Reclamation and Enforcement
OZ	Ore Zone Monitoring Interval
PA	Programmatic Agreement
PABFh	Palustrine, Aquatic Bed, Seasonally Flooded, Diked
PCPI	Per Capita Personal Income
PEMC	Palustrine, Emergent, Seasonally Flooded
PFYC	Potential Fossil Yield Classification System
pH	Hydrogen ion activity
PLIC	Public Lands Information Center
PM	Particulate Matter
PM_{10}	Particulate Matter 10 Microns or Less
$PM_{2.5}$	Particulate Matter 2.5 Microns or Less
PMT	Photomultiplier Tube
PPE	Personal Protective Equipment
PSD	Prevention of Significant Deterioration
PSHA	Probabilistic Seismic Hazard Analysis
PTE	Potential to Emit
PUBFh	Palustrine, Unconsolidated Bottom, Semipermanently Flooded, Diked
PUG	Physical Upgrading
PVC	Polyvinyl Chloride
PWMTF	Permanent Wyoming Mineral Trust Fund
R	Resistivity
R&D	Research and Development

LIST OF ABBREVIATIONS/ACRONYMS (CONTINUED)

RAP	Restoration Action Plan
RCRA	Resource Conservation and Recovery Act
RER	Rare Element Resources Ltd.
RFFA	Reasonable Foreseeable Future Actions
RG	Regulatory Guide
RIS	Regulatory Issue Summary
RO	Reverse Osmosis
Ross	Ross ISR Project
Ross CPP	Ross ISR Project Central Processing Plant
RPM	Radiation Protection Manual
SA	Surficial Aquifer
SAIPE	Small Area Income and Poverty Estimates
SAR	Sodium Adsorption Ratio
SCS	Soil Conservation Service
SDWA	Safe Drinking Water Act
SEIS	Supplemental Environmental Impact Statement
SER	Safety Evaluation Report
SERP	Safety and Environmental Review Panel
SHPO	State Historic Preservation Office
SHWD	Solid and Hazardous Waste Division
SIP	Wyoming State Implementation Plan
SM	Shallow Monitoring Zone
SO_2	Sulfer Dioxide
SODAR	Sonic Detection and Ranging
SOP	Standard Operating Procedure
SP	Spontaneous Potential
SPCC	Spill Prevention, Control, and Countermeasure
SSA	Sole Source Aquifer
Strata	Strata Energy, Inc.
SWPPP	Storm Water Pollution Prevention Plan
T&E	Threatened and Endangered
TBNG	Thunder Basin National Grassland
TCP	Traditional Cultural Property
TDS	Total Dissolved Solids
TEDE	Total Effective Dose Equivalent
TENORM	Technologically Enhanced Naturally Occurring Radioactive Material
TEOM	Tapered Element Oscillating Microbalance
THPO	Tribal Historic Preservation Office
TPI	Total Personal Income
TR	Technical Report
TREO	Total Rare Earth Oxides
UBC	Uniform Building Code

LIST OF ABBREVIATIONS/ACRONYMS (CONTINUED)

UCL	Upper Control Limit
UDP	Unanticipated Discovery Plan
UIC	Underground Injection Control
UL	Upper Lance
UMTRCA	Uranium Mill Tailings Radiation Control Act of 1978
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USCB	U.S. Census Bureau
USDA	United States Department of Agriculture
USDW	Underground Source of Drinking Water
USFS	United States Forrest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UW	Univeristy of Wyoming
VOC	Volatile Organic Compound
VRM	Visual Resource Management
WAAQS	Wyoming Ambient Air Quality Standards
WAAS	Wide Area Augmentation System
WAQSR	Wyoming Air Quality Standards and Regulations
WARMS	Wyoming Air Resources Monitoring System
WCDA	Wyoming Community Development Authority
WDAI/EA	Wyoming department of Administration and Information, Economic Analysis Division
WDEQ	Wyoming Department of Environmental Quality
WGFD	Wyoming Game and Fish Department
WNA	World Nuclear Association
WOGCC	Wyoming Oil & Gas Conservation Commission
WOHS	Wyoming Office of Homeland Security
WoUS	Waters of the U.S.
WQD	Water Quality Division
WRCC	Western Regional Climate Center
WSEO	Wyoming State Engineer's Office
WSGS	Wyoming State Geological Survey
WW	Warm-Water
WWDC	Wyoming Water Development Commission
WYCRO	Wyoming Cultural Records Office
WYDOT	Wyoming Department of Transportation
WYPDES	Wyoming Pollutant Discharge Elimination System

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4.0 POTENTIAL ENVIRONMENTAL IMPACTS

Following guidance in NUREG-1748, this chapter describes the potential environmental impacts by resource for the Proposed Action and No Action Alternative. This chapter describes how the Proposed Action would extend the duration and area but not increase the magnitude of the potential environmental impacts approved for the Ross ISR Project. Each section of this chapter describes the potential environmental impacts by project phase: construction, operation, aquifer restoration, and decommissioning.

4.1 Potential Land Use Impacts

The proposed KEA is located in western Crook County and is contiguous to the Ross ISR Project. As discussed in Section 3.1 of this ER, existing land uses include livestock grazing on rangeland, oil production, dry land crop production, communication and power lines, transportation, recreation, reservoirs, and wildlife habitat. This section describes the potential land use impacts resulting from the Proposed Action and No Action Alternative. Section 5.1 of this ER describes the mitigation measures proposed by Strata to minimize potential land use impacts.

4.1.1 Proposed Action

The Proposed Action would extend the duration and expand the area of the potential land use impacts approved for the Ross ISR Project. As part of the Proposed Action, Strata will construct approximately 54 sequentially developed wellfield modules within the proposed KEA to recover uranium for processing at the Ross CPP. Associated infrastructure that would be constructed under the Proposed Action includes access roads, module buildings, booster pump stations, pipelines, utilities, and laydown or storage areas. Table 4.1-1 presents the total anticipated disturbance throughout the duration of the Proposed Action. Of the approximately 7,874 acres within the proposed KEA, approximately 1,050 acres are anticipated to be disturbed over the life of the project. This represents approximately 13% of the total proposed KEA.

Using the project schedule in Figure 1.4-1 of this ER and the baseline features depicted in Figure 3.1-3 of this ER, Strata developed potential plan views of the Proposed Action for each of the project phases (Figures 4.1-1 through 4.1-4). The timeframes represented on the figures depict estimates of the amount of development that might occur at the end of the construction phase (i.e., just prior to initiation of operations within the proposed KEA), at the end of operations, and at the end of aquifer restoration. Each of these figures is described below.

Figure 4.1-1 depicts the anticipated facilities at the end of the construction phase. The time frame represented by Figure 4.1-1 is approximately year 6 in Figure 1.4-1 of this ER. The facilities anticipated to be constructed include the wellfield access roads and pipelines to the first two

mine units. Construction and installation are also anticipated to have been completed on the module buildings in the first two mine units along with some of the production patterns; however, wellfield modules are not shown on this figure, since most wellfield construction will occur after the end of the initial construction phase (i.e., construction without concurrent operations). In addition, the booster pump station required for the first two mine units is anticipated to have been constructed.

Figure 4.1-2 portrays the anticipated facilities at the end of operations. All of the wellfield access roads, wellfield modules, module buildings, booster pump stations and supporting pipelines will be constructed. The time frame represented by Figure 4.1-2 is approximately year 15 in Figure 1.4-1 of this ER. This time frame represents the end of concurrent operations with aquifer restoration and the beginning of the aquifer restoration only project phase.

Figure 4.1-3 depicts the anticipated facilities at the end of aquifer restoration. The time frame represented by Figure 4.1-3 is approximately the end of year 17 in Figure 1.4-1 of this ER. This is the time period after regulatory approval of successful aquifer restoration and stability monitoring of the final wellfield modules. At this time the production and injection wells will have been plugged and abandoned and associated pipelines will have been removed. The figure assumes that the wellfield baseline wells and perimeter monitor wells would remain as necessary for any compliance purposes.

Figure 4.1-4 portrays conditions at the end of decommissioning, which is, effectively, the current baseline plan view.

4.1.1.1 Potential Construction Impacts

Potential land use impacts resulting from construction under the Proposed Action include temporarily changing and disturbing existing land uses, restricting access, affecting mineral rights, and restricting livestock grazing and recreational activities. As described in Section 5.1.1 of this ER, potential land use impacts will be mitigated by phasing wellfield construction, restoring and re-seeding disturbed areas promptly, coordinating construction activities with oil production companies, and using existing roads and oilfield access roads where possible. The following describes the potential land use impacts during construction associated with the Proposed Action.

4.1.1.1.1 Changing and Disturbing Existing Land Uses

Surface disturbance will occur as a result of construction of wellfield modules, access roads, booster pump stations, pipelines, and utilities. Potential changes or disturbances in land use resulting from the construction of these facilities are discussed below. Potential impacts resulting from surface disturbance will be small due to the relatively small disturbance area and due to restoring and re-seeding of much of the disturbed area during the same construction season. Potential future land use impacts resulting from surface disturbance will be negligible, since the entire proposed KEA will be returned to pre-operational use and released for unrestricted use following project D&D.

Wellfield Modules

Each wellfield module will consist of injection and recovery wells connected to a common module building and associated monitor wells. Construction of the approximately 54 wellfield modules planned within the proposed KEA is estimated to disturb approximately 882 acres. However, construction will be phased such that only two (2) to six (6) modules will be under construction at one time. The maximum amount of surface disturbance associated with wellfield module construction is estimated to be approximately 65 acres at any one time.

Surface disturbing activities associated with wellfield module construction will include topsoil stripping, constructing temporary well pads, constructing temporary access roads, excavating mud pits, trenching for pipelines and buried electrical utilities, and excavating foundations for module buildings. The primary land use within the wellfield modules (livestock grazing) will change temporarily; however, temporary well pads, mud pits, well pad access roads, and pipelines will be restored and re-seeded at the end of construction. Therefore, disruption to livestock grazing will be temporary except for fenced wellfield areas and the relatively small area surrounding and including each module building.

Other land uses within areas potentially disturbed by wellfield module construction include industrial use (oil production), communication and power lines, transportation, recreation, reservoirs, and wildlife habitat. Strata will work with the operating oil companies within the proposed KEA to ensure that Strata causes no interruptions in oil production activities. Communication

lines, power lines, and county roads will be avoided during wellfield module construction. There will be no changes in these land uses with the exception of brief traffic interruptions resulting from pipeline and utility crossings of existing county and private roads. Potential recreation impacts are described below, potential impacts to reservoirs are described in Section 4.4.1 of this ER, and potential impacts to wildlife are described in Section 4.5 of this ER. All of these potential impacts are expected to be small due to the limited disturbance area associated with wellfield module construction and due to restoring and re-seeding disturbed areas, typically within a single construction season.

Booster Pump Stations

Strata plans to construct approximately four booster pump stations within the proposed KEA. The booster pump stations will provide the pressure necessary to transport wellfield solutions between the proposed KEA and the Ross CPP in trunk lines. The maximum estimated surface disturbance associated with booster pump station construction is 2 acres.

Access Roads

Access roads constructed within the proposed KEA will include secondary access roads to the wellfield module buildings and booster pump stations and tertiary access roads used to access monitor wells, and temporary access roads used during construction. The maximum estimated surface disturbance associated with access road construction is 126 acres. This includes laydown areas and access road topsoil stockpiles, which will be located throughout the wellfield area. The locations of topsoil stockpiles have yet to be determined, but they typically will be spaced approximately 2,000 feet apart along secondary access roads to minimize compaction, fugitive dust, noise and emissions associated with long topsoil hauls.

Surface disturbing activities associated with access road construction include topsoil stripping and stockpiling, excavation, backfill, compaction, and grading. Secondary access roads generally will follow the existing topography, and tertiary and secondary access roads will be unconstructed, two-track roads. Additional information on access road construction is included in Section 4.2 of this ER.

Access roads predominantly will be constructed on land currently used for livestock grazing. Potential changes in this land use will be small and temporary. While up to 126 acres are estimated to be disturbed during access road construction, only about half of this area will be surfaced with gravel. For instance, the disturbance width for a secondary access road is estimated to range from 25 to 35 feet, depending on whether pipelines and utilities are included in the access corridor. By comparison, the finished road surface is expected to be only 12 to 20 feet wide. Adjacent disturbed areas will have the topsoil replaced and will be re-seeded at the end of construction. Surface disturbance also will be minimized by locating access roads, pipelines, and utilities in common corridors and by utilizing existing roads where possible. The proposed KEA has the advantage of encompassing several county roads and oil production access roads. Strata will use these roads where possible and coordinate the road use with Crook County and the oil production companies.

Pipelines

Pipelines will include trunk lines carrying barren lixiviant and recovery solutions and aquifer restoration solutions between the module buildings and the Ross CPP and individual well flow lines carrying these solutions between the module buildings and injection/recovery wells. The disturbance area associated with individual well flow lines has been included in the estimated wellfield module disturbance area, and the majority of the disturbance area associated with trunk lines and feeder lines has been included in the estimated access road disturbance area. The total estimated disturbance area resulting from trunk lines that are not in an access corridor is 25 acres.

Surface disturbing activities associated with pipeline construction will include topsoil stripping, trenching, backfill, topsoil replacement, and re-seeding. Pipeline corridors will be restored and re-seeded, typically within the same construction season, and changes in land use will be accordingly brief. Potential changes in land use are small and similar to those described previously for wellfield module construction, but the potential impacts will be smaller due to a smaller disturbance area and lack of fences or buildings associated with pipeline construction. Surface disturbance will be minimized by locating pipelines in common corridors with access roads and utilities where possible.

Utilities

Utilities that are anticipated to be installed under the Proposed Action include overhead electrical lines supplying electrical power from a nearby transmission line to the module buildings and booster pump stations and buried electrical lines providing power within wellfield modules. The total estimated disturbance resulting from utility construction is 15 acres. Potential changes and disruptions to existing land uses will be temporary, since areas disturbed during utility installation will be restored and re-seeded, typically within a single construction season.

4.1.1.1.2 Access Restrictions and Establishment of Right-of-Way

The primary land use within the proposed KEA is livestock grazing on rangeland. This land use will be impacted during construction through the exclusion of livestock from disturbed areas and fenced areas as necessary. To the extent practicable, Strata anticipates limiting these areas during construction. Not all of the construction disturbance will occur at once due to phased wellfield development, and much of the disturbed area will be restored, re-seeded and made accessible. Strata estimates that up to 11% of the proposed KEA (wellfield modules) will be fenced to exclude livestock during construction. Access for dry land crop production, wildlife habitat, and recreation will be similarly impacted during construction.

Strata will work with the oil production companies operating within the proposed KEA to ensure that Strata causes no access restrictions on oil production activities.

No public right-of-way will be established during construction. All access roads will be private access roads for Strata employees and contractors. All access roads constructed under the Proposed Action will be reclaimed during decommissioning unless they are transferred to the affected landowner during decommissioning.

4.1.1.1.3 Mineral Rights

The only known mineral in the proposed KEA other than those proposed to be developed by Strata is conventional oil. Currently there are 16 producing oil wells, 8 water injection wells, 3 water supply wells, 5 disposal wells, and 1 other well used for enhanced oil recovery within the proposed KEA (refer to

Table 3.1.8 of this ER). Oil is produced from a depth of 6,500 feet and greater, which is approximately 5,400 feet deeper than the uranium mineralization found in the proposed KEA. The existing oil wells and water injection wells will not be impacted by the Proposed Action due to the large difference in target completion intervals between oil production (6,500 to 7,000 feet) and ISR injection and recovery wells (approximately 200 to 1,000 feet). One aspect of oil production that likely will be impacted by the Proposed Action is the water supply wells used for EOR. These wells are completed in the ore zone aquifer. Strata will work with the oil production companies to provide an alternate supply of water or an alternate method for EOR as described in Section 5.4 of this ER.

Since no other minerals are currently being extracted in the proposed KEA, the Proposed Action will not impact existing non-oil mineral production. However, future development of any other minerals within the proposed KEA could be delayed for the duration of the Proposed Action.

4.1.1.1.4 Livestock Grazing and Agricultural Restrictions

As shown in Table 3.1-2 of this ER, approximately 98% of the land use within the proposed KEA is attributed to livestock grazing and dry land crop production. No further restrictions will be made on these land uses beyond the access restrictions discussed in Section 4.1.1.1.2 of this ER. Livestock and agricultural land use will be restricted temporarily from disturbed areas, but much of the disturbance area will be restored and re-seeded during a single construction season, so the impacts primarily will be short lived. Longer term access restrictions will occur for the fenced wellfield areas. As described previously, the total fenced area is estimated to be approximately up to 11% of the proposed KEA.

Grazing permits on State of Wyoming surface potentially will be impacted by construction of fenced wellfield areas. Surface use agreements will be established between Strata and surface owners/lessees to provide mitigation or compensation for temporary loss of areas currently used for livestock grazing or crop production.

4.1.1.1.5 Restrictions on Recreational Activities

Potential impacts to recreational activities, including hunting, will be small under the Proposed Action. The primary potential for impact will be restricted access. To protect workers, hunting will be restricted from the proposed KEA during the life of project subject to landowner agreements. Big game hunting, including mule deer, white-tailed deer and pronghorn, is currently limited in the proposed KEA due to the small percentage of publicly owned lands (approximately 13.1%). As discussed in Section 3.1 of this ER, hunting and recreation are not major land use activities in the proposed KEA.

4.1.1.2 Potential Operation Impacts

Potential impacts to land use during operation are expected to be small and less than those during construction, since many of the short-term disturbance areas will be reclaimed. Potential land use impacts primarily will result from continued wellfield module construction and fenced wellfields. Strata will limit the fenced area to the wellfield modules. Unlike the Ross ISR Project, the proposed KEA will not have a fenced processing facility area. Strata anticipates that up to approximately 11% of the proposed KEA will be fenced during operation.

4.1.1.3 Potential Aquifer Restoration Impacts

Potential land use impacts during aquifer restoration will be similar to those during operation and are expected to be small. Relatively small portions of the proposed KEA will be used temporarily for industrial purposes rather than the predominant pre-operational land use of livestock grazing and dry land crop production. During aquifer restoration, Strata will continue to temporarily restrict public access within the wellfield modules undergoing aquifer restoration.

4.1.1.4 Potential Decommissioning Impacts

During decommissioning, surface disturbance would temporarily increase compared to operation and aquifer restoration because of additional equipment associated with land reclamation and dismantling, removing, and disposing of wellfield materials, pipelines and the module buildings and booster pump stations. The disturbed land will be returned to the approximate pre-construction surface topography and drainage patterns and revegetated in

accordance with WDEQ/LQD requirements. Following decommissioning, all land in the proposed KEA will be released for unrestricted use.

4.1.2 No Action Alternative

Under the No Action Alternative, the Ross ISR Project license would not be amended and ISR wellfields and associated infrastructure within the proposed KEA would not be constructed. The land use within the proposed KEA would not change from its current use.

Table 4.1-1. Anticipated Disturbance within Proposed KEA

Facility	**Acres of Anticipated Disturbance for Proposed Action**
Wellfield Modules	882
Booster Pump Stations	2
Access Roads	126
Pipelines	25
Utilities	15
Total	1,050

R. 68 W. R. 67 W.

E. 700000 E. 710000 E. 720000

N. 1500000 N. 1490000 N. 1480000 N. 1470000 N. 1460000

T. 54 N. T. 53 N. T. 52 N.

68 D ROAD NEW HAVEN ROAD 164 193 116 CABIN CREEK ROAD 211 DEADMAN ROAD OSHOTO CONNECTION 16 CABIN CREEK & MORSE ROAD

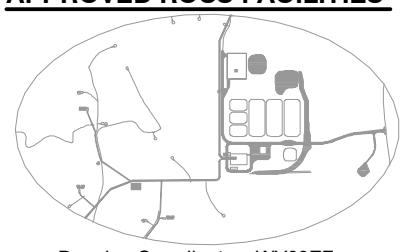
Ash Draw Good Lad Creek Berge Hill Drill Hole Pipeline Flowing Well River Well Gravel Pit Spring Oshoto Missouri Oshoto Reservoir Lagoon Uranium Mine Well Deadman Creek Sidner Draw Brosa Draw Pine Flats Flatiron Butte Thompson North Prong Little Missouri Oil Well Pumping Station

LEGEND

- ROSS LICENSE NO. SUA-1601 BOUNDARY
- PROPOSED KENDRICK EXPANSION AREA BOUNDARY
- 211 EXISTING COUNTY ROAD
- EXISTING SECONDARY ACCESS ROAD
- EXISTING UNIMPROVED ROAD
- PROPOSED SECONDARY ACCESS ROAD
- PROPOSED PIPELINE CORRIDOR
- APPROXIMATE PERIMETER MONITOR WELL RING
- PROPOSED LAYDOWN AREA
- PROPOSED TOPSOIL STOCKPILE
- EXISTING CULVERT LOCATIONS
- PROPOSED CULVERT LOCATIONS
- PROPOSED WELLFIELD MODULE BUILDING
- PROPOSED BOOSTER PUMP STATION

NOTE:
PROPOSED TERTIARY ROADS NOT SHOWN.

APPROVED ROSS FACILITIES



Drawing Coordinates: WY83EF

Basemap: USGS 1:24,000
Brislawn School, Garland Hill, Flag Butte, Oshoto, Rozet NE, and Edith Creek

0 1,500 3,000 4,500 6,000

GRAPHIC SCALE (FEET)

STRATA ENERGY INC
A WHOLLY-OWNED SUBSIDIARY OF PENINSULA ENERGY LIMITED

ROSS ISR PROJECT
CROOK COUNTY, WY
LICENSE NO. SUA-1601
P.O. BOX 2318, 1900 W WARLOW UNIT A
GILLETTE, WY 82717

REVISIONS	
Date	Description

KENDRICK EXPANSION AREA
ENVIRONMENTAL REPORT
FIGURE 4.1-1

ANTICIPATED FACILITIES AT THE END OF CONSTRUCTION

Drawn By: MBM
Checked By: WCF
Date: 3/13/15
FILE: KPA1_FACIL_EO_CONSTRUCTION

WWC ENGINEERING
www.wwcengineering.com

K:\Sheridan\Strata\12145_ACAD_WY83E\DWGS_NRC\KPA1_FACIL_EO_CONSTRUCTION.dwg 3/13/2015 2:44:26 PM mal mcgill

E. 700000 E. 710000 E. 720000

R. 68 W. R. 67 W.

T. 54 N. T. 53 N.

N. 1500000 N. 1490000 N. 1480000 N. 1470000 N. 1460000

68 164 193 211 116 16

D ROAD NEW HAVEN ROAD OSHOTO CONNECTION DEADMAN ROAD CABIN CREEK ROAD CABIN CREEK & MORSE ROAD

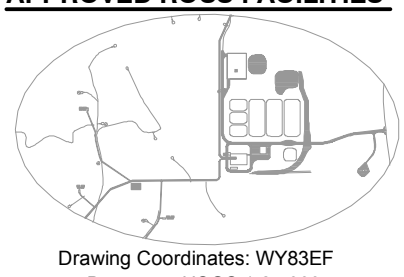
Oshoto Oshoto Reservoir Flatiron Butte Uranium Mine Pumping Station

LEGEND

- ROSS LICENSE NO. SUA-1601 BOUNDARY
- PROPOSED KENDRICK EXPANSION AREA BOUNDARY
- EXISTING COUNTY ROAD
- EXISTING SECONDARY ACCESS ROAD
- EXISTING UNIMPROVED ROAD
- PROPOSED SECONDARY ACCESS ROAD
- PROPOSED PIPELINE CORRIDOR
- APPROXIMATE PERIMETER MONITOR WELL RING
- PROPOSED LAYDOWN AREA
- PROPOSED TOPSOIL STOCKPILE
- EXISTING CULVERT LOCATIONS
- PROPOSED CULVERT LOCATIONS
- PROPOSED WELLFIELD MODULE BUILDING
- PROPOSED BOOSTER PUMP STATION
- APPROXIMATE WELLFIELD EXTENT

NOTE:
PROPOSED TERTIARY ROADS NOT SHOWN.

APPROVED ROSS FACILITIES



Drawing Coordinates: WY83EF

Basemap: USGS 1:24,000
Brislawn School, Garland Hill, Flag Butte, Oshoto, Rozet NE, and Edith Creek

0 1,500 3,000 4,500 6,000

GRAPHIC SCALE (FEET)

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A WHOLLY-OWNED SUBSIDIARY OF PENINSULA ENERGY LIMITED

ROSS ISR PROJECT
CROOK COUNTY, WY
LICENSE NO. SUA-1601
P.O. BOX 2318, 1900 W WARLOW UNIT A
GILLETTE, WY 82717

REVISIONS	
Date	Description

KENDRICK EXPANSION AREA
ENVIRONMENTAL REPORT
FIGURE 4.1-2

ANTICIPATED FACILITIES AT THE END OF OPERATIONS

Drawn By: MBM
Checked By: WCF
Date: 3/13/15
FILE: KPA1_FACIL_EO_OPERATION

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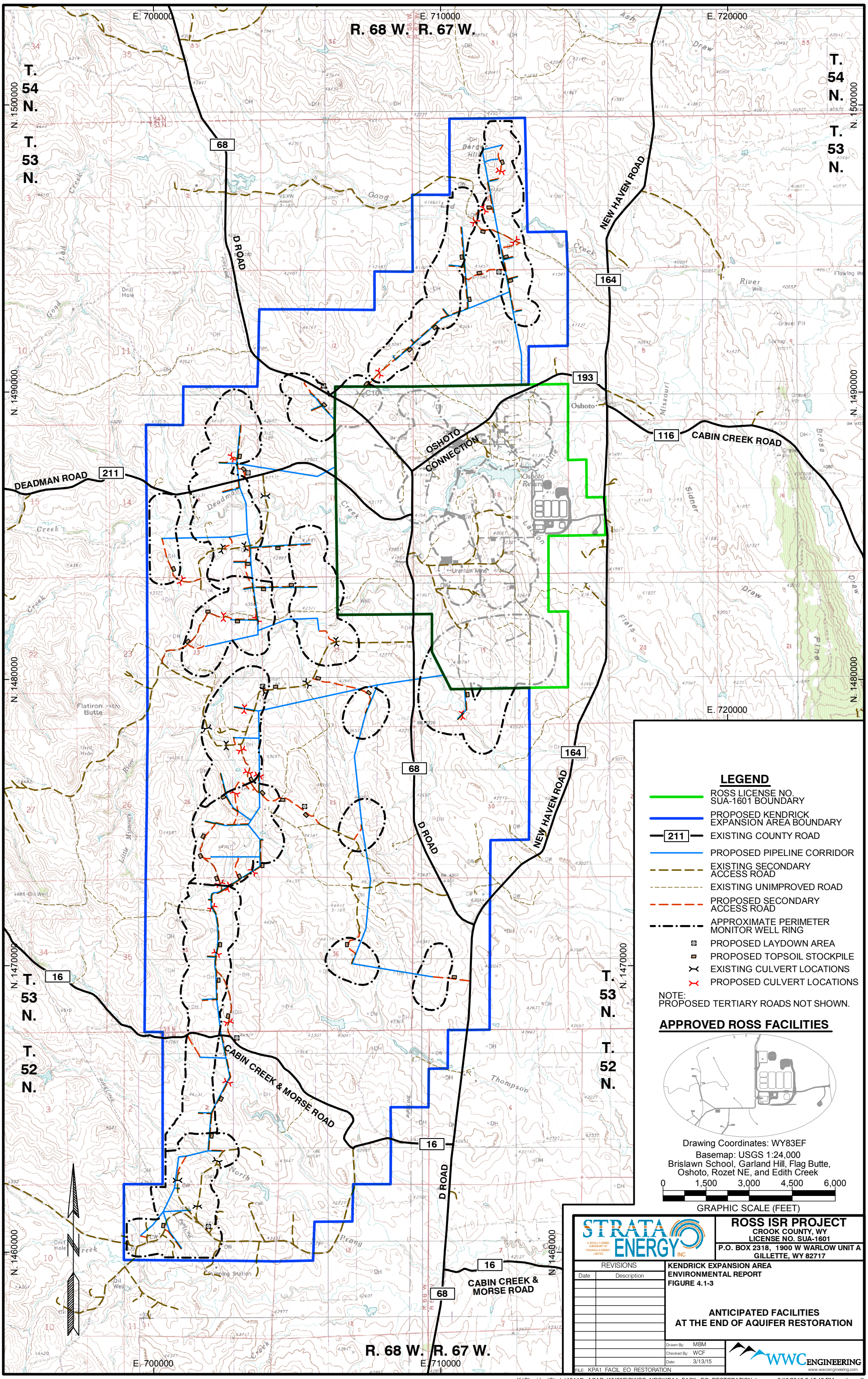

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REVISIONS	
Date	Description

KENDRICK EXPANSION AREA
ENVIRONMENTAL REPORT
FIGURE 4.1-3

ANTICIPATED FACILITIES AT THE END OF AQUIFER RESTORATION

Drawn By: MBM
Checked By: WCF
Date: 3/13/15
FILE: KPA1_FACIL_EO_RESTORATION

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E. 700000 E. 710000 E. 720000

R. 68 W. R. 67 W.

N. 1490000 N. 1480000 N. 1470000 N. 1460000

T. 53 N.

68 164 D ROAD NEW HAVEN ROAD 193 CABIN CREEK ROAD 116 OSHOTO CONNECTION DEADMAN ROAD 211 CABIN CREEK & MORSE ROAD 16

TANKS
SEPARATOR
WELLHEAD

SEPARATORS
PUMPJACK
TANKS

DISPOSAL WELL
SEPARATORS
WELLHEAD
TANKS

PUMPJACK
SEPARATOR
TANKS

PUMPJACK
TANKS
SEPARATOR
3 PONDS

PUMPJACK
SEPARATORS
TANKS
INJECTION WELL
SEPARATORS
TANKS
PUMPJACK
INJECTION WELL
STAGING AREA

PUMPJACK
SEPARATOR
TANKS
INJECTION WELL
SEPARATOR
PUMPJACK
TANKS
INJECTION WELL
PUMPJACK

WELLHEAD
SEPARATOR
SUBSTATION
PUMPJACK
WELLHEAD
SEPARATORS
SEPARATOR LAYDOWN AREA
TANK
TANKS
METERING BUILDING
INJECTION WELL
2 SEPARATORS
BUILDINGS
TANKS
WELLHEAD
WELLHEAD
SHOP
PONDS
DISPOSAL WELL
BUILDING
TANKS
SUBSTATIONS
INJECTION WELL
PUMPJACK
INJECTION WELL

0 1,500 3,000 4,500 6,000
GRAPHIC SCALE (FEET)

Basemap: USGS 1:24,000
Flag Butte and Oshoto

Drawing Coordinates: WY83EF

LAND USE CATEGORIES

LEGEND

- ROSS LICENSE NO. SUA-1601 BOUNDARY
- PROPOSED KENDRICK EXPANSION AREA BOUNDARY
- 164 COUNTY ROAD
- INDUSTRIAL
- CROPLAND AND PASTURE
- HERBACEOUS RANGELAND
- MIXED RANGELAND
- RESERVOIRS
- TRANSPORTATION, COMMUNICATION, AND UTILITIES

SOURCE: USGS (2005) with Cropland adjusted according to 2009 NAIP aerial imagery, Industrial and Reservoirs adjusted according to 2012 NAIP aerial imagery and Google Earth 2014.

STRATA ENERGY INC

ROSS ISR PROJECT
CROOK COUNTY, WY
LICENSE NO. SUA-1601
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REVISIONS

Date	Description

KENDRICK EXPANSION AREA
ENVIRONMENTAL REPORT
FIGURE 4.1-4

ANTICIPATED FACILITIES AT THE END OF DECOMMISSIONING

Drawn By: MBM
Checked By: BAK
Date: 3/13/15
FILE: KPA1_FACIL_EO_DECOMMISSION

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4.2 Potential Transportation Impacts

This section describes the potential transportation impacts resulting from the Proposed Action and No Action Alternative.

4.2.1 Proposed Action

The Proposed Action would result in extending the duration but not increasing the magnitude of the potential transportation impacts approved for the Ross ISR Project. Potential transportation impacts will occur during all phases of the Proposed Action, including construction, operation, aquifer restoration, and decommissioning. The following describes how the potential impacts evaluated for the Ross ISR Project will be extended.

The main route for transporting all materials and workers will be the same as that for the Ross ISR Project, which is north from Interstate 90 along D Road for 18.3 miles, then continuing north along the New Haven Road 3.0 miles to the Ross primary access road. Secondary access roads will connect the wellfields within the proposed KEA with D Road and the New Haven Road.

Strata and Crook County have an MOU for the Ross ISR Project, according to which Strata provides assistance with road maintenance, dust control, and speed limit controls on affected county roads. Strata will work with the county to update the MOU as needed to accommodate the Proposed Action. Strata also will continue communication and cooperation with the operating oil companies within the proposed KEA to address use of private oilfield roads.

4.2.1.1 Potential Construction Impacts

Access Road Construction

Secondary access roads will include roads constructed between the Ross CPP and the wellfield module buildings and booster pump stations. Secondary access roads will be 12 to 20-foot wide gravel surfaced roads that will allow easy movement of opposing vehicles, at low speeds, on an all-weather surface. Secondary access roads generally will follow existing topography, and little cut or fill will be required for their construction. Temporary wellfield access roads and monitor well access roads (tertiary roads) generally will be un-constructed, two-track roads approximately 8 to 10 feet wide. Temporary and tertiary access roads typically will not have any surfacing and generally will have no cut or fill

associated with their construction. As these roadways become unused they will be reclaimed to their natural condition by replacing topsoil, if previously removed, ripping the soil, as needed to reduce compaction, and re-seeding.

The preliminary layout of proposed access roads is shown in Figure 4.1-2 of this ER. Potential impacts resulting from access road construction are discussed in the following sections of this ER and briefly summarized below.

- Potential land use impacts – Section 4.1
- Potential soil impacts – Section 4.3
- Potential water resources impacts – Section 4.4
- Potential vegetation and wildlife impacts – Section 4.5
- Potential vehicle emissions and dust impacts – Section 4.6
- Potential noise impacts – Section 4.7
- Potential historic and cultural resources impacts – Section 4.8
- Potential visual and scenic resources impacts – Section 4.9

Potential land use impacts resulting from access road construction include temporarily changing and disturbing land use. This will be minimized by utilizing existing county and oilfield roads where possible and promptly restoring and re-seeding temporary and tertiary access roads when no longer used. The disturbance area associated with access road construction will also be minimized by implementing a one-way in/one-way out driving approach, where sequentially developed wellfield modules will be accessed through previously developed modules, and therefore will use previously constructed access roads. This will avoid constructing new access roads from the Ross CPP to remote wellfield modules. Instead, shorter roads will be constructed from existing wellfield modules. While this may slightly increase the driving distance to some wellfield modules, it will minimize the required number and overall length of access roads.

Potential soil impacts include increased erosion from vegetation removal and soil disturbance and soil compaction. Erosion will be mitigated through minimizing access road width and the number of access roads (through use of

existing roads). Soil compaction will be mitigated through ripping affected soil, as needed, during decommissioning.

Potential water resource impacts include water quality degradation due to sediment transport. Sediment transport will be minimized through the use of erosion control BMPs such as silt fence, sediment logs, and straw bale check dams. Sediment transport will also be minimized by restoring and revegetating disturbed areas not covered with gravel, typically during a single construction season.

Potential wildlife impacts include vehicle collisions and wildlife avoidance due to noise, dust, or human and mechanical presence. These potential impacts will be mitigated through speed limits, dust abatement, and avoiding sensitive areas such as wetland and reservoir habitat during access road construction.

Potential vehicle emissions and dust impacts include emissions from heavy equipment and passenger vehicles during access road construction and fugitive dust generated from surface disturbing activities. These will be mitigated by minimizing access road width and the number of access roads (through use of existing roads) and by implementing dust control BMPs.

Potential noise impacts include increased noise levels, primarily due to the heavy equipment operated during access road construction. Mitigation measures include restricting access road construction activities during nighttime hours and controlling speeds.

Potential historic and cultural resources impacts include disturbing cultural resource sites and temporarily limiting access to cultural resource sites. Mitigation measures include avoidance, where possible, of potentially NRHP-eligible historic properties, consultation with SHPO and affected Tribal Historic Preservation Officers (THPOs), and implementing a stop-work provision as required by LC 9.8 of SUA-1601 if any previously unidentified cultural resources are discovered during access road construction.

Potential visual and scenic resource impacts include altering the landscape and generating dust. These potential impacts will be reduced or avoided by minimizing road widths and the number of access roads (through use of existing roads), by constructing secondary and tertiary access roads along existing topography to minimize cut/fill and reduce the visual contrast

created by straight roads, by implementing dust control BMPs, and by controlling speeds.

Traffic

Construction activities will be completed by a "wellfield crew" of approximately 25 people, which will carry over from the Ross ISR Project. The Proposed Action is not anticipated to increase the maximum estimate of 200 workers for Ross ISR Project construction, since construction activities within the proposed KEA will occur after the primary construction phase of the Ross ISR Project.

Traffic projections provided in Table 3.2-3 of this ER include the anticipated workforce of the Ross ISR Project. These traffic projections are not anticipated to change as a result of the Proposed Action. The table shows that the changes to traffic on Interstate 90 are minor, while proportional increases in traffic along affected portions of D Road and the New Haven Road will be greater. Mitigation measures for potential traffic impacts on these roads are described in Section 5.2.2 of this ER and include adhering to the Crook County MOU, which includes provisions for maintenance, dust control, and speed limit controls; developing and implementing a speed limit policy for Strata employees and contractors traveling on county roads; and, potentially, implementing a park and ride system to transport workers to and from the site from local towns.

4.2.1.2 Potential Operation Impacts

The Proposed Action is anticipated to extend the duration but not increase the magnitude of the potential transportation impacts resulting from the Ross ISR Project. Since the size of the operational workforce is not anticipated to increase under the Proposed Action, the employee traffic is not anticipated to increase. The anticipated workforce of the Ross ISR Project is up to 60 people (up to 120 one-way passenger vehicle trips).

In addition, the following material shipments to and from the Ross CPP were approved for the Ross ISR Project and will not change as a result of the Proposed Action.

1) Up to 75 shipments of yellowcake per year from the Ross CPP to a uranium conversion facility

2) Up to 4 bulk chemical, fuel and supply deliveries per working day

3) Up to 4 shipments of uranium-loaded IX resin to the Ross CPP per day

4) Approximately 5 shipment of 11e.(2) byproduct material per year from the Ross CPP to a licensed disposal facility

5) Approximately 1 shipment of solid waste per week from the Ross CPP to a local municipal landfill

6) Approximately 1 shipment of hazardous waste per month from the Ross CPP to a recycling or disposal facility permitted by WDEQ Solid Hazardous Waste Division (SHWD) or a nearby state

Yellowcake Shipment

Transportation of dried yellowcake will be made in exclusive-use transport vehicles to a licensed conversion facility in Metropolis, Illinois for further processing. The potential shipment route is shown in Figure 4.2-2 of the Ross ER. The distance from the Ross CPP to the conversion facility is approximately 1,260 miles. A representative driving route is described in Ross ER Section 4.2.1.2.

The dried yellowcake produced at the Ross CPP will be packaged in 55-gallon, DOT-approved steel drums. Based on weight limits for legal transport, each shipment will contain approximately 40,000 pounds of yellowcake. Based on the licensed maximum annual production rate of 3 million pounds of yellowcake per year, up to 75 shipments could be required annually or an average of one shipment every 4.9 days. This is within the annual range of 21 to 145 yellowcake shipments for typical ISR facilities presented in Table 2.8-1 of the ISR GEIS.

Strata will contract with an appropriately licensed transport company that specializes in shipment of yellowcake. The transport company will have extensive emergency response programs including spill response equipment on board. Drivers will be trained in emergency response procedures, and there will be constant monitoring of truck location and operating parameters. The transport companies will also have standing contracts with environmental emergency response contractors for spill cleanup. Yellowcake shipments will be handled as low-specific-activity (LSA) material. Pursuant to LCs 10.4 and 12.11 of SUA-1601, Strata will have SOPs for emergency procedures for accidents

resulting in a yellowcake spill and transportation of licensed material outside of the license area. Strata will perform a radiological survey of the affected area following spill cleanup if a yellowcake spill should occur.

NUREG-0706 states that the probability of a truck accident is in the range of 1.6 to 2.6 x 10^{-6}/mile. Based on the average of these two values, the likelihood of a truck shipping yellowcake being involved in an accident of any type during a one-year period is approximately 20%. This probability was obtained by multiplying the probability of an accident per vehicle-mile (2.1 x 10^{-6}/mile) by the maximum number of shipments per year (75) and the distance per shipment (1,260 miles). It is important to note that a minority of accidents will result in release of yellowcake. According to a report prepared for the Federal Motor Carrier Safety Administration (2001), the likelihood that an en route accident will result in a release, based on 12 categories of hazardous material transportation, is about 31%. Further, as described in Section 4.2.2.2 of the ISR GEIS, 30% or less of the shipment contents were released in previously reported accidents involving yellowcake release. Therefore, while there is an estimated 20% probability that an accident involving yellowcake shipment will occur in any one year, there is only about a 31% probability that the accident will result in a release of yellowcake, and then the volume of yellowcake released will likely be 30% or less of the quantity shipped. Based on a 40,000-pound typical load, this would result in a release of 12,000 pounds or less of yellowcake.

Potential impacts resulting from the release of yellowcake include a very small risk of radiological impacts to people in the vicinity of a potential accident. As described in Section 4.2.2.2 of the ISR GEIS, an analysis of potential risk from an ISR facility generating 34 shipments of yellowcake per year yielded an estimate of 0.01 (complete loss of package contents) and 0.0008 (partial release) cancer deaths per year from yellowcake accidents. The ISR GEIS notes that, “These analyses are conservative and tend to overestimate impacts.” Nevertheless, applying these conservative risk factors to the maximum of 75 shipments per year produced from the Ross ISR Project yields estimates of 0.02 (complete loss of package contents) and 0.002 (partial release).

Process Chemical and Fuel Shipment

Transportation of process chemicals and fuel to the Ross CPP will follow all applicable DOT hazardous material shipping regulations and requirements. Nevertheless, environmental impacts could occur if a truck transporting process chemicals or fuel is involved in an accident. Any spill would be contained and the affected area remediated.

Process chemicals range from nonreactive solids with very low environmental risk if released (e.g., sodium chloride) to liquids with significant environmental risk if released (e.g., sulfuric acid) to toxic gases such as anhydrous ammonia. Transportation accidents involving fuel (diesel, gasoline, and propane) shipment also present potential environmental impacts. Fuel will be transported from a nearby town such as Moorcroft, Gillette or Sundance, which will minimize the trip distance and keep the probability of an accident very low.

Loaded Resin Shipments

The uranium recovery circuit at the Ross CPP will be designed to process up to 3 million pounds per year of U_3O_8. Depending on production, the Ross CPP may be capable of processing additional uranium-loaded IX resin from satellite ISR facilities, including those owned and/or operated by Strata and those owned and/or operated by other ISR licensees, and from other water treatment entities generating uranium-loaded IX resins that are the same or substantially similar to those generated at ISR facilities. Uranium-loaded IX resin would be transported to the Ross CPP in tanker trailers with 500 cubic-foot capacity. A transportation accident resulting in release of uranium-loaded IX resin would have a lower risk than the relatively low risk from an accident involving yellowcake described previously. As described in Section 4.2.2.2 of the ISR GEIS, IX resin contains a much lower concentration of uranium than yellowcake and the uranium is chemically bound to the IX resin and is therefore less likely to spread and easier to remediate in the event of a spill. Further, although there would be more frequent shipments of uranium-loaded IX resin than yellowcake, the distance traveled would typically be less, so the total distance traveled would likely be less. If an accident occurred with loaded resin the impacted soils would be salvaged and shipped to a licensed 11e.(2) byproduct material disposal site, the topsoil and vegetation

would be replaced, and Strata would perform a post-reclamation radiological survey to verify that no long-term hazards would be present.

11e.(2) Byproduct Material Shipment

11e.(2) byproduct material will be transported to a licensed disposal site. Before Ross ISR Project operations begin, Strata will provide NRC a copy of the agreement with a licensed disposal facility to accept 11e.(2) byproduct material pursuant to LC 12.5 of SUA-1601. Shipments will be handled as LSA material and will generally be made in sealed roll-off containers in accordance with the applicable DOT hazardous materials shipping provisions.

The risk of an accident involving the transporting of 11e.(2) byproduct material will be kept to a minimum by the use of proper packaging and exclusive use shipments. Similar to transportation of yellowcake, Strata will contract with a transport company that provides training and emergency response procedures specific to the transport of 11e.(2) byproduct material.

At present Strata plans to ship 11e.(2) byproduct material to one of the following four disposal facilities:

- Pathfinder Mines Corporation – Shirley Basin Facility, WY
- White Mesa Uranium Mill – Blanding, UT
- Energy Solutions LLC – Clive Disposal Site – Clive, UT
- Waste Control Specialists LLC – Andrews, TX

In the future, Strata may also consider shipping 11e.(2) byproduct material to Kennecott's Sweetwater Uranium Mill, which is currently on standby.

Potential transportation routes to each 11e.(2) byproduct material disposal facility are listed in Ross ER Section 4.2.1.2. The 11e.(2) byproduct material shipments will be very infrequent and will not significantly impact the daily traffic compared to other operations.

Solid Waste Shipment

Solid waste will be transported to municipal landfills in Moorcroft (approximately 23 road miles south), Gillette (approximately 50 road miles southwest) and/or Belle Fourche, South Dakota (approximately 92 road miles

east). The solid waste shipments will result in minimal traffic impacts. Section 4.13 of this ER describes the estimated quantities, management, disposal, minimization, and potential impacts of solid waste disposal in more detail.

Hazardous Waste Shipment

Potential hazardous waste transportation impacts are discussed in Section 4.13 of this ER. Hazardous waste will be transported to an off-site treatment, storage and disposal or recycling facility that is licensed by WDEQ/SHWD or a nearby state to manage hazardous waste. These shipments will occur infrequently and will not result in significant traffic impacts.

4.2.1.3 Potential Aquifer Restoration Impacts

The potential transportation impacts during aquifer restoration are expected to be similar to or less than potential impacts during operation. Strata expects the number of workers to decline significantly during aquifer restoration, which would also decrease traffic proportionally on Interstate 90 and affected portions of D Road and the New Haven Road.

4.2.1.4 Potential Decommissioning Impacts

Decommissioning activities within the proposed KEA will require a smaller workforce and fewer material shipments compared to the Ross ISR Project, since there will not be any processing facilities, lined retention ponds or deep disposal wells to decommission. The anticipated workforce of the Ross ISR Project is up to 90 people (up to 180 passenger vehicle trips). In general, the potential transportation impacts during decommissioning are anticipated to be similar to the construction phase.

4.2.2 No Action Alternative

Under the No Action Alternative, the Ross ISR Project license would not be amended and access roads within the proposed KEA would not be constructed. The transportation impacts associated with the Ross ISR Project would not be extended in duration.

4.3 Potential Geology and Soils Impacts

4.3.1 Proposed Action

The Proposed Action would extend the duration and expand the area of the potential geology and soils impacts approved for the Ross ISR Project. Section 4.1 of this ER describes how approximately 1,050 acres of land, or about 13% of the proposed KEA, may be disturbed during the life of the project. Similar to the Ross ISR Project, activities potentially resulting in soil impacts include clearing vegetation, topsoil stripping, excavation, backfill, compaction, grading, and utility and pipeline trenching. There will be limited potential impacts to geology within the proposed KEA due to the minor depth of land disturbance activities.

Based on the total anticipated disturbance area of 1,050 acres and the average topsoil depth of 1.20 feet (Section 3.3 of this ER), the volume of proposed KEA topsoil temporarily stockpiled is estimated to be about 2,000,000 cubic yards. This estimate is conservatively high due to the following factors: (1) where possible, wellfield infrastructure and access roads will be located outside of the 100-year flood inundation area, where topsoil is relatively thin compared to flood-prone areas; (2) topsoil generally will not be removed from unconstructed, two-track access roads including tertiary access roads and temporary access roads; and (3) much of the topsoil will be replaced promptly after removal, such as that temporarily removed during pipeline and utility trenching. Access road topsoil stockpiles will be located throughout the proposed KEA, where they will typically be spaced approximately 2,000 feet apart along access roads to minimize compaction, fugitive dust, noise, and emissions associated with long topsoil hauls.

4.3.1.1 Potential Construction Impacts

During construction, soils will have the potential to be impacted by soil loss, compaction, salinity, loss of soil productivity, and soil contamination. Potential impacts to geology would be related to minor disturbance in the subsoil during construction. As described in Section 5.3.1 of this ER potential impacts to geology will be mitigated by minimizing impacts to shallow geologic features and maintaining injection pressures in the Class III wells at levels that do not exceed the fracture gradient of the receiving formations.

The following describes the potential soil impacts during construction associated with the Proposed Action.

4.3.1.1.1 Potential Construction Impacts to Soil

Potential soil impacts are similar to those occurring from the approved Ross ISR Project and may include soil loss, compaction, salinity, loss of soil productivity and soil contamination. Mitigation measures to reduce or avoid potential soil impacts are described in Section 5.3 of this ER.

Soil Loss

Wind and water erosion are the two greatest sources of potential soil loss. The soils within the proposed KEA have a slight to severe potential to be affected by wind erosion (Section 3.3.5 of this ER). Two soil types, making up approximately 16% of the proposed KEA, have a severe potential for wind erosion. Water erosion hazards range from negligible to moderate within the proposed KEA.

Soil Compaction

Within the proposed KEA, soils will have the potential to be compacted as a result of heavy equipment operation during construction. Soil compaction could result in a decrease in infiltration, thereby increasing runoff. To decrease the potential for soil compaction, Strata will use existing roads where possible and rip compacted soils, as needed, during decommissioning as described in Section 5.3 of this ER.

Salinity

The salinity of the soils within the proposed KEA was evaluated during the baseline soil survey. Saline soils are very susceptible to soil loss caused by development. The baseline soils survey results indicate that saline soils are not present in the proposed KEA, and therefore the potential soil loss risk is low. No soil salinity hazards will typically be present during construction.

Loss of Soil Productivity

Soil productivity may be affected during construction. Excavation activities may impact the structure and microbial activity of the topsoil resulting in a loss of organic matter. Similarly, soils may be mixed or

compacted during excavation and stockpiling resulting in the breakdown of soil structure and loss of pore space. These activities not only impact the soil, but may create conditions not conducive to vegetation. To minimize soil productivity impacts, Strata will utilize BMPs described in Section 5.3 of this ER such as properly segregating topsoil from subsoil during topsoil stripping and seeding topsoil stockpiles with a temporary seed mixture.

Soil Contamination

During construction, potential soil impacts could occur from introduction of drilling fluids or drilling muds to soils near the recovery, injection, and monitor wells. The volume of drilling fluids and muds will be small, and these will be contained within mud pits constructed at each well. The potential soil contamination impact resulting from drilling fluids or mud is therefore small. Additional details are provided under TENORM waste management in Section 4.13 of this ER.

Potential soil impacts could also occur from leaking fuel or oil from heavy construction equipment and passenger vehicles operated during construction. The volume of leaks typically would be small and result in only localized impacts. Oil-contaminated soil would be disposed off-site as described in Section 4.13 of this ER. Spills or leaks will be mitigated by immediate cleanup response.

4.3.1.2 Potential Operation Impacts

During operation, there will be a very low risk of hydraulic fracturing due to operation of the Class III injection wells. Potential impacts will be reduced or eliminated by maintaining the injection pressure that does not exceed the gradient of the receiving formation as described in Ross TR Section 3.1.4 and as required by LC 10.14 of SUA-1601.

During operation, potential soil impacts could occur from compaction from vehicles on tertiary and temporary access roads. Compaction will be mitigated by ripping tertiary and temporary access roads and importing topsoil if needed during reclamation. Potential soil contamination within the proposed KEA will be limited to areas near pipelines, wellfields, module buildings and booster pump stations. A pipeline leak could potentially result in topsoil or subsoil contamination depending on the type of fluid, quantity of spilled fluid,

and location of the leak. In the wellfield, potential pipeline leaks include ruptures of injection or recovery well feeder lines or trunk lines. Small leaks could also occur at pipe joints and fittings at the wellheads. Until remedied, these leaks may drip injection or recovery solutions onto the surrounding soil. To minimize the potential for pipeline leaks, Strata will hydrostatically test all pipelines during construction and institute leak detection monitoring as described in Ross TR Section 3.1.7. Wellfield leak detection monitoring and control will include continuous measurement of flows and pressures for injection and recovery trunk lines and feeder lines and inclusion of leak detection sensors in valve vaults, booster pump stations, and well head sumps. A leaking pipeline within a module building or booster pump station could potentially impact the surrounding soil. This risk will be minimized by providing secondary containment for module buildings and booster pump stations and by providing leak detection equipment.

4.3.1.3 Potential Aquifer Restoration Impacts

During aquifer restoration, potential geology impacts will be small and limited to the very low risk of hydraulic fracturing due to Class III injection well operations. Potential soil impacts will include compaction and contamination from spills and leaks. Overall, the potential soil impacts will be smaller than during operation since there will be less wellfield traffic and fluids transported in the wellfield pipelines will not include lixiviant or recovery solutions. Section 5.3 of this ER describes the mitigation measures Strata will use to limit potential impacts.

4.3.1.4 Potential Decommissioning Impacts

During decommissioning, potential geology and soil impacts will be similar to those occurring during construction. Potential geology impacts will be limited to minor subsoil disturbance. The risk of compacting soil will temporarily increase due to increased heavy equipment operation. Local impacts will also potentially occur as contaminated soils are removed and disposed. Heavy equipment operation also increases the risk of soil contamination from fuel or oil leaks. These potential impacts will be mitigated by ripping compacted soils prior to topsoil replacement and re-seeding and by immediately cleaning up any oil or fuel-contaminated soil.

4.3.2 No Action Alternative

Under the No Action Alternative, the Ross ISR Project license would not be amended and ISR wellfields and associated infrastructure would not be constructed within the proposed KEA. Therefore, associated disturbance and potential impacts to geology and soils would not occur within the proposed KEA.

4.4 Potential Water Resources Impacts

4.4.1 Potential Surface Water Impacts

The Proposed Action would extend the duration and expand the area of the potential surface water impacts approved for the Ross ISR Project. As described in Section 3.4.1 of this ER, the proposed KEA is located within the upper reaches of the Little Missouri River Basin and the Belle Fourche River Basin. Figure 4.4-1 depicts the proposed facilities in relation to surface water features. The proposed KEA facilities have been designed to minimize potential surface water impacts.

4.4.1.1 Potential Construction Impacts to Surface Water

During construction, potential surface water impacts could occur primarily from site disturbing activities such as wellfield, access road, pipeline, and utility installation. The site disturbing activities will include vegetation removal and topsoil stockpiling, limited periods of low-impact stream channel disturbance, and minor wetland encroachment. These activities have the potential to result in minor hydrocarbon spills, primarily related to fuel and lubricants from heavy equipment operation.

Surface water quality within the proposed KEA has the potential to be adversely impacted by increasing suspended sediment concentrations due to vegetation removal and soil disturbance. A summary of the proposed disturbance is presented in Table 4.1-1 of this ER. This includes disturbance of approximately 1,050 acres during the life of the Proposed Action, or about 13% of the proposed KEA. Figure 4.4-1 depicts the location of anticipated facilities and surface water features within the proposed KEA. During construction, temporary sediment control features will be used until vegetation can be re-established to minimize the potential impacts to surface water due to vegetation removal and soil disturbance. Temporary sediment control features will be used as described in Section 5.4 of this ER, including silt fence, sediment logs, straw bale check dams or other BMPs.

Stream channels within the proposed KEA will be minimally impacted from construction activities. Roads will be constructed away from drainages where possible. Where it is necessary to cross a stream channel, the crossing will be made perpendicular to the channel and will include a low-water

crossing or culvert capable of passing the runoff resulting from the 10-year, 24-hour precipitation event. Strata estimates that seven stream channel crossings will be constructed and seven existing stream channel crossings will need to be rehabilitated. In addition, some tertiary access roads will cross ephemeral draws. These channel crossings will consist of unconstructed, two-track trails. Ephemeral stream channel crossings will involve minimal disturbance and will not be used during flow events. The potential impacts to surface water from ephemeral stream channel crossings will include increased sediment load due to vegetation and soil disturbance. Sediment load will be mitigated by sediment control BMPs described in Section 5.4 of this ER.

Pipeline stream channel crossings will potentially impact surface water in a similar fashion to access road crossings. Pipeline crossings will be constructed in the same corridor as access road crossings where possible to minimize disturbance. Sixteen pipeline stream channel crossings not within access road corridors are anticipated within the proposed KEA. The potential impacts to surface water from construction activities involving a stream channel will be minimized by routing flow around active construction operations, storing it in temporary sediment ponds, or passing it through sediment control measures prior to discharge.

ISR injection and recovery wells will not be constructed in existing deeply incised drainage channels, but some wells may be constructed in the 100-year flood inundation area within the proposed KEA. BMPs described in Section 5.4 of this ER will be implemented to minimize sediment transport due to well installation (e.g., silt fence, sediment logs, straw bale check dams, etc.) and to protect the injection, recovery and monitor wells from flooding (e.g., cement seals around the well casing and watertight well caps).

Accidental spills and leaks (e.g., equipment leaks) may also affect surface water during construction. The potential impacts to water quality associated with leaks, spills, or equipment failures will depend on several factors including: type of material spilled, size of spill, location of spill relative to surface water, and remediation methods. Potential impacts from accidental spills and leaks will be small due to the small volume, rapid cleanup response, location of construction activities away from surface water features where possible, and containment controls such as mud pits. BMPs described in

Section 5.4 of this ER will be implemented to reduce or avoid potential impacts to surface water from accidental spills or leaks.

Surface water may be impacted during construction due to water discharge from aquifer testing and pipeline integrity testing. During construction of the wellfield, Strata will have coverage under a temporary WYPDES permit to discharge construction water generated from these types of activities. BMPs such as energy dissipation and sediment control devices at the point of discharge will minimize potential surface water impacts. Section 5.4.1 of this ER describes how potential surface water impacts will be mitigated by modifying and adhering to Strata's general construction WYPDES permit (WYR104738) issued by WDEQ/WQD. Under the WYPDES permit, Strata is required to implement a storm water pollution prevention plan (SWPPP), which includes erosion and sediment controls. Prior to any land disturbing activities, Strata will modify the SWPPP to include the proposed KEA. The SWPPP will describe the nature and sequence of construction activities, identify potential sources of pollution, and describe the BMPs that will be used, including erosion and sediment controls (e.g., silt fences, sediment logs, and triangular silt dikes) and other controls (e.g., sediment tracking and good housekeeping).

The proposed KEA includes approximately 86 acres of potential aquatic resources, as discussed in Section 3.4.2 of this ER. Construction within the proposed KEA has the potential to impact up to 8 acres of aquatic resources. Impacts to aquatic resources will be mitigated, as required by USACE, by enhancing existing wetlands or constructing new wetlands. Based on this evaluation, construction impacts to surface water are expected to be small.

4.4.1.2 Potential Operation Impacts to Surface Water

During operation, surface disturbing activities will be limited to ongoing wellfield development, and vegetation will have been re-established in previously disturbed areas. Therefore, the potential water quality impacts from sediment transport will be much lower during operation than during construction. Since new wellfield modules will continually be constructed during operation, sediment control BMPs will continue to be implemented to ensure that potential sediment transport and related surface water impacts remain small.

Prior to ISR operations in the proposed KEA, Strata will modify the Industrial General WYPDES Storm Water Permit approved for the Ross ISR Project or receive authorization under an individual storm water permit to include the proposed KEA. Qualified Strata personnel will inspect storm water BMPs semiannually or as required by the WYPDES storm water permit and maintain inspection reports on file. The SWPPP and associated maps will be updated as needed, such as in response to potential problems identified during inspections or changes in operation (e.g., transition from operation to aquifer restoration).

During operation, there will be additional risks to surface water quality that require specific mitigation measures. These include potential spills from pipelines, module buildings, and booster pump stations. A pipeline leak near or beneath a stream channel could potentially result in surface water quality degradation depending on the type of fluid, quantity of fluid spilled, and location of the leak. In order to protect surface water at pipeline crossings, Strata will incorporate WDEQ/WQD requirements for potable water stream crossings into the design and construction of all pipeline stream crossings. These include providing a minimum of 2 feet (0.61 m) of cover (4 to 6 feet will typically be provided) over the pipe to guard against damage from livestock and to protect against freezing, providing pipe with flexible, watertight joints such as PVC or HDPE, and installing accessible isolation valves at both ends of water crossings so that the section can be isolated for testing or repair. In addition, Strata will hydrostatically test all pipelines during construction.

Module buildings and booster pump stations will not be located within stream channels or within the 100-year flood inundation boundary. Nevertheless, surface water quality could be impacted if a leak inside a module building or booster pump station reached a stream channel or reservoir. Potential surface water quality impacts from spills in module buildings or booster pump stations will be minimized by leak testing all pipe and equipment during installation, providing secondary containment for module buildings and booster pump stations, providing leak detection equipment, and by frequent inspection by wellfield operators. In addition, Strata will adhere to SUA-1601 license conditions, including LC 10.14 of SUA-1601, which requires Strata to conduct weekly visual inspections of the wellfield piping, wellheads, and module buildings. Additional mitigation measures that will reduce the potential

impacts to surface water during operation are described in Section 5.4.1 of this ER.

4.4.1.3 Potential Aquifer Restoration Impacts to Surface Water

Potential surface water impacts from aquifer restoration activities are similar to those occurring during operation and include sediment transport due to surface disturbing activities and potential leaks or spills in the wellfield. These potential impacts are all expected to be similar or less than those resulting from operations. Surface disturbing activities will be very limited during aquifer restoration, reducing the potential for sediment transport from disturbed areas. During aquifer restoration, the same levels of protection described previously will be provided to minimize potential surface water impacts from leaks or spills. Potential impacts from leaks or spills will be less than those occurring during operations, since no lixiviant or recovery solution will be present. Mitigation measures described in Section 5.4.1 of this ER and SUA-1601 license conditions will reduce the potential for surface water impacts.

4.4.1.4 Potential Decommissioning Impacts

Sediment yield and storm water runoff have the potential to increase during decommissioning due to disturbances associated with equipment and structure removal and site reclamation activities. In general, potential impacts will be similar to or less than those discussed during construction, since reclamation and decommissioning of the wellfield modules will be ongoing throughout the life of the project. This will likely reduce the area of disturbance during the final decommissioning activities. Strata will mitigate any potential surface water impacts by adhering to WYPDES and implementing BMPs described in the SWPPP and used at the Ross ISR Project.

4.4.2 Potential Groundwater Impacts

The Proposed Action would extend the duration and expand the area of the potential groundwater impacts approved for the Ross ISR Project. Similar to the Ross ISR Project, the Proposed Action could potentially impact groundwater in the non-exempt aquifer surrounding the ore zone (OZ), the overlying (SM) and underlying (DM) monitoring intervals, and the surficial aquifer (SA). The

following describes the potential groundwater impacts by project phase and by aquifer or monitoring interval.

4.4.2.1 Potential Construction Impacts

4.4.2.1.1 Surficial Aquifer (SA)

Potential construction impacts to groundwater quality within the surficial aquifers within the proposed KEA will be associated with potential spills and leaks from construction equipment and drilling fluids and muds. As discussed in Section 3.4.3.2.4 of this ER, the shallowest aquifer at many of the regional baseline well clusters is a confined upper Lance Formation sand, which means that at many locations within the proposed KEA there is a low-permeability layer between the surface and the first water-bearing interval. Where present, this low-permeability layer will further reduce the potential for leaks or spills to impact shallow aquifers within the proposed KEA. Mitigation measures described in Section 5.4.2 of this ER will lessen the potential surficial aquifer groundwater impacts. During construction,

4.4.2.1.2 Deeper, Confined Aquifers and Monitoring Intervals (SM, OZ, and DM)

Within the proposed KEA, the underlying, overlying and adjacent aquifers have the potential to be impacted by well delineation drilling and well installation. However, potential impacts would be reduced using the mitigation measures described in Section 5.4.2 of this ER. In addition, Strata will adhere to LCs 10.5 and 10.12 of SUA-1601. LC 10.5 requires mechanical integrity testing (MIT) on each well before the well is utilized and at least every 5 years the well is in use. LC 10.12 requires Strata to attempt to locate and abandon historical drill holes within the perimeter monitor well ring prior to conducting tests for the wellfield data package. Since there will not be any Class I deep disposal wells within the proposed KEA, there will not be any potential impacts to the aquifers below the underlying (DM) monitoring interval. During construction, aquifer tests will be conducted in accordance with LC 10.13 of SUA-1601 to demonstrate isolation of the ore zone.

4.4.2.2 Potential Operation Impacts

Since the Proposed Action would extend the duration and area of the Ross ISR Project, many of the operational impacts described in the Ross ER are

applicable to the Proposed Action. Similar to the Ross ISR Project, operations within the proposed KEA will have the potential to impact groundwater via spills and leaks, excursions and wellfield development. A number of factors limit the potential for these impacts, including natural conditions, regulatory oversight and final restoration of the exempted aquifer. Natural conditions that limit potential impacts include geologic isolation of the mineralized sandstones, hydraulic confinement within the exempted mineralized intervals, and geochemical isolation due to the static nature of the redox boundary. A second factor limiting the potential for impacts lies in the amount of regulatory oversight required to recover uranium via these methods. Regulated techniques for ISR operations, including well construction, MIT, excursion monitoring to provide "early warning" of potential fluid migration toward non-exempted aquifers, and wellfield balance and bleed, have evolved to the point where these procedures complement and enhance the above-noted naturally occurring conditions to provide ongoing, iterative mitigation measures with the flexibility to adjust to site-specific conditions in order to protect adjacent sources of drinking water. Finally, restoration of the exempted aquifer following operations provides a third significant factor limiting the potential for impacts. Because ISR development is typically iterative and progressive, practioners are constantly improving techniques for recovery and, more importantly, restoration of the aquifer. The natural confining conditions, when combined with the flushing of recovery solutions to achieve restoration, together serve as the primary bases for mitigation of any potential long-term impacts to adjacent sources of drinking water.

4.4.2.2.1 SA Water Quality

During operation, the water quality of the surficial aquifer has the potential to be impacted by leaks or spills in the wellfields, module buildings, booster pump stations, and pipelines. However, the potential for impacts will be less than that evaluated for the Ross ISR Project since there will not be any processing facilities, lined retention ponds, or deep disposal wells within the proposed KEA. Lixiviant will be continuously injected and recovered from the wellfield modules during operation. The recovery solutions will be transported through pipelines to module buildings and pumped to the Ross CPP for processing. A potential impact to the surficial aquifer could result from a pipeline leak or a shallow break in the casing of an injection well. Since the

pipelines will be buried, leaking solution has potential to seep into the surficial aquifer. To ensure pipelines do not fail, Strata will conduct hydrostatic pressure testing on all pipelines prior to use and install leak detection devices in valve vaults, module buildings, booster pump stations, and along the pipelines. Strata will also monitor recovery and injection pipelines and immediately shut down affected pumps if a leak is detected (Ross TR Sections 3.1.4 and 3.1.7 detail pipeline integrity testing and instrumentation/control methods). MIT will be conducted on all Class III injection wells, recovery wells, and monitor wells pursuant to LC 10.5 of SUA-1601 to ensure that the surficial aquifer is protected from well casing leaks. Monitor wells will be installed and monitored for excursion indicators in areas where the SA aquifer is comprised of saturated unconsolidated alluvium in accordance with LC 11.5 of SUA-1601. Mitigation measures described in Section 5.4.2 of this ER and adherence to SUA-1601 license conditions will minimize the potential impacts to the water quality of the surficial aquifer.

4.4.2.2.2 SA Water Quantity

Under the Proposed Action, there will not be any potential impacts to water quantity in the surficial aquifer, since no construction activities or water usage are proposed in the surficial aquifer within the proposed KEA.

4.4.2.2.3 SM, OZ, and DM Water Quality

Similar to the Ross ISR Project, Strata will amend Permit to Mine No. 802 to include the proposed KEA through WDEQ/LQD. As part of the modification, the ore zone within the proposed KEA will be reclassified. Based on water quality samples collected during baseline data collection (Section 3.4.3.4 of this ER), the OZ aquifer groundwater within the proposed KEA is assumed to be Class IV (industrial use only) based on WDEQ/WQD Chapter 8, Table 1 criteria. Exceedances of the Class I, II, and/or III standards were measured for pH, TDS, sulfate, radium-226 & 228 and gross alpha. Exceedances of EPA primary drinking water standards were measured for uranium, radium-226 & 228 and gross alpha. Given these exceedances, water from this aquifer is not likely suitable for human or livestock/wildlife consumption. Furthermore, the OZ aquifer in the vicinity of the proposed wellfield modules will qualify for aquifer exemption under the requirements of 40 CFR § 146.4(b)(1) (i.e., it cannot now and will not in the future serve as a source of drinking water

because it is mineral producing, or can be demonstrated as part of a permit application to contain minerals that considering their quantity and location are expected to be commercially producible). Following a decision by WDEQ/WQD on reclassification, WDEQ/LQD will request an aquifer exemption from EPA per the 1982 Memorandum of Understanding.

During operations, the groundwater quality in the exempted aquifer will be impacted as part of the uranium ISR process. The uranium in the ore zone will be oxidized and mobilized by introducing lixiviant (native groundwater and fortified with oxidizing and complexing agents) into the OZ aquifer through the Class III injection wells. In addition to the uranium, other constituents will be mobilized, including anions, cations, and trace metals (Ross TR Section 6.1.6.2 describes the estimated water quality of the OZ aquifer at the end of uranium recovery operations). Impacts to the exempted aquifer water quality will be short term, since aquifer restoration will take place in a phased manner with uranium recovery.

There is potential to impact the quality of the non-exempted OZ aquifer outside of the perimeter monitor well rings via a lateral excursion resulting from a local wellfield imbalance. Beyond natural limiting factors, Strata will minimize the potential for lixiviant migration through a variety of operational methods. First, wellfield integrity will be demonstrated in each wellfield package in accordance with LC 10.13 of SUA-1601. In addition to the water quality testing of the DM, SM and OZ aquifers (both inside and outside the proposed wellfield area), hydrologic testing through pumping of recovery wells in the wellfield area and measuring response in surrounding perimeter monitor wells is a significant component of the wellfield package development. Wellfield pumping and measured response in the perimeter monitor wells demonstrates wellfield integrity through similarity of completions. Second, Strata will maintain a net inward hydraulic gradient in each wellfield in accordance with LC 10.7 of SUA-1601. Third, groundwater modeling conducted in support of the NRC and WDEQ/LQD applications for uranium recovery and permit to mine demonstrates that groundwater movement through these sedimentary systems can be accurately modeled and, more importantly, predicted. The predictive capability of Strata's groundwater model (see Ross TR Addendum 2.7-H) was used to develop monitor well layouts protective of the non-exempt portions of the OZ aquifer and was based on over 30 years of EOR withdrawals.

Geologic evaluation and hydrologic testing conducted in support of each wellfield package will also be utilized to demonstrate the integrity of the underlying and overlying confining units, through monitoring the DM and SM monitor wells while pumping the recovery wells. Aquifer testing by Strata within the proposed KEA did not record a response in vertically adjacent aquifers; moreover, the amount of confining head and contrasting water qualities observed in these aquifers further demonstrate that there is adequate ore zone isolation to safely conduct ISR.

In addition to the limiting factors such as natural conditions and an enhanced understanding of the groundwater flow regime developed to support the wellfield packages, Strata will utilize operational instrumentation and control networks described in detail in Ross ER Section 4.4.2.3.3 to further minimize the potential for water quality impacts to adjacent non-exempt and overlying and underlying aquifers. These operational controls include:

- Attempting to locate and abandon historical drill holes located within the perimeter well ring in accordance with LC 10.12 of SUA-1601. Applicable drill holes will be plugged and abandoned in accordance with WDEQ/LQD requirements, as described in Ross TR Addendum 2.6-E.
- Conducting MIT on each well before it is utilized, at least every 5 years of use, and on wells that have been serviced with equipment or procedures that could damage the well casing in accordance with LC 10.5 of SUA-1601.
- Semi-monthly excursion monitoring in accordance with LC 11.5 of SUA-1601.
- Monitoring of injection manifold pressures and flow rates per LC 10.14 of SUA-1601 and perimeter monitor well water surface elevations to ensure that wellfield balance and a net inward hydraulic gradient are maintained in accordance with LC 10.7 of SUA-1601.

4.4.2.2.4 SM, OZ, and DM Water Quantity

The potential for impacts to the amount of water available in the SM and DM intervals resulting from the proposed action is small given the natural confinement and measures discussed in Section 4.4.2.2.3 of this ER. However, in the unlikely event of a vertical excursion of lixiviant-fortified groundwater to the SM or DM intervals, mitigation measures may require withdrawal and treatment of impacted groundwater. These withdrawals would be minimal given

that in all likelihood the excursion conduit would be due to anthropogenic activities (e.g., well failure or unplugged borehole) and would result in a limited extent of impact. Given the relatively small borehole diameter used for exploration and delineation, little water would be capable of migrating through one or more of these conduits. An additional control on the amount of water that could impact the SM or DM systems is the frequent monitoring visits to the wells targeting these systems. Very little time would be available for discernible amounts of undetected lixiviant to enter these aquifers. Therefore, a small amount of water would have to be removed from the system to return to baseline characteristics.

Potential impacts to the SM aquifer water quantity due to withdrawals during operation and restoration in the OZ aquifer were evaluated through the regional groundwater model (Addendum 3.4-I, Section 4.9.3). Modeling indicates that potential impacts to this highly confined system would be small. Under the scenario evaluated, the estimated maximum amount of drawdown ranged from approximately 10 feet to 25 feet inside of the proposed KEA. Figure 4.4-2 depicts the estimated drawdown following both operation and aquifer restoration phases at the proposed KEA. Based on water level measurements in the proposed KEA regional baseline cluster wells, the amount of available head in the SM aquifer ranges from approximately 115 feet to 520 feet above the top of the SM aquifer. A worst case scenario (least amount of available head and maximum drawdown) is predicted to result in a decrease of roughly 22% in the amount of available head. A reduction in the amount of head is not likely to result in a measurable decrease in well yield. Potential impacts to the water quantity in the SM aquifer are predicted to be small during operation and aquifer restoration activities.

In addition to estimating potential impacts to the SM aquifer water quantity within the proposed project area generally, groundwater modeling simulations also evaluated potential impacts to two industrial use wells in and near the proposed KEA that are believed to be perforated or completed in the SM aquifer: the Kiehl Water Well #2 and Mellott Ranch WS-2 wells (refer to Figure 4.4-2 and Table 4.4-1). The model predicted that the drawdowns at the Kiehl Water Well #2 and Mellott Ranch WS-2 wells due to uranium recovery operations and aquifer restoration would be 24.2 and 11.9 feet, respectively. The modeled drawdowns represent declines in the available head above the top of the SM aquifer of approximately 50.4% and 2.7%, respectively, at each well.

In each case the modeled drawdown is not expected to materially decrease the yield from the well. WSEO records indicate that the Kiehl Water Well #2 is completed in both the SM and OZ aquifers, with the larger completion interval in the OZ aquifer; therefore, even if the drawdown were significantly higher in the SM aquifer, it is unlikely that the well yield would be significantly impacted. Furthermore, the available head in the Kiehl Water Well #2 was estimated based on the water level reported for the well in the WSEO statement of completion form. Since the well is completed across multiple aquifers, the reported water level likely represents the water level at the time the well was installed in the lower completion interval, which is in the OZ aquifer where the potentiometric surface is lower in the SM aquifer. The SM potentiometric surface presented in Figure 3.4-30 of this ER suggests that the available head could be as high as 140 feet at the Kiehl Water Well #2. As a result, the water level in the SM aquifer is likely underestimated and the potential impacts to the well overestimated. As described in Addendum3.4-I, the Mellott Ranch WS-2 well is not currently being used because it did not produce a sufficient amount of water to support EOR operations. Table 4.4-1 summarizes the location, use and estimated drawdowns at the wells.

Within the OZ aquifer, the maximum estimated drawdown outside of the proposed KEA at the end of the aquifer restoration phase is approximately 73 feet near the Wesley #1 well east of the Ross license area, while the estimated maximum drawdown is between 30 and 40 feet throughout most of the proposed KEA. The estimated drawdown along the northern, western, and southern edges of the proposed KEA boundary at the end of aquifer restoration is approximately 30 feet. During active operations, the model-predicted drawdowns within the OZ aquifer are as high as 110 feet locally within the operating wellfields. These higher drawdowns are predicted to occur primarily within the immediate vicinity of the wellfields, and the water levels are predicted to recover to the 30 to 40-foot drawdown interval within just a few months following the completion of operations in each wellfield. As described in Section 3.4.3.2.2 of this ER, the available potentiometric head above the top of the OZ aquifer ranges from approximately 200 feet to over 580 feet in the proposed KEA. A worst-case scenario drawdown (maximum drawdown at a location with the least available head) represents a short-term drawdown of approximately 55% of the available head above the top of the OZ aquifer. Assuming an average drawdown of approximately 40 feet and an average of

350 feet of available head above the top of the OZ aquifer, the average drawdown in the OZ aquifer is closer to 11% of the available head at the end of the aquifer restoration phase. Figure 4.4-3 depicts the model-predicted drawdown in the OZ aquifer following both operation and aquifer restoration.

Of the thirteen EOR wells completed in the OZ aquifer described on Table 4.4-1, only six (22X-19, 19XX State, 789V State, Sophia #1A, WSW #1 West Kiehl Unit, and Mellott Ranch WS #3) are located within 0.5 mile of proposed KEA or Ross wellfields. As described in Addendum 3.4-I, when ISR operations approach the 22X-19, 19XX State, and 789V State wells, Strata plans to work with the oil company to abandon the wells and replace them with an alternate well within the proposed KEA. The modeled drawdown results demonstrate that this is a viable solution and moving the stress will eliminate the potential for interference during ISR operations. As described in Addendum 3.4-I, the Mellott Ranch WS #3 well has been plugged and abandoned, the WSW #1 West Kiehl Unit well is not currently operating, and, although the status has not been confirmed with the operator, the Sophia #1A well also may be shut in. The Federal Schuricht #2 well operates periodically. Under the anticipated schedule, the Federal Schuricht #2 well is not expected to be impacted until near the end of ISR operation within the proposed KEA. Therefore, sufficient time is available for Strata to develop a plan similar to the one developed for the EOR wells within the Ross license area to eliminate potential interference. The model-predicted maximum drawdown at the Federal Schuricht #2 well is 38.9 feet, which represents a drawdown of only about 4.9% of the estimated available head in the OZ aquifer at this location. As such, potential impacts to the EOR wells in and around the proposed KEA are expected to be minimal.

Four stock and/or domestic wells located near the proposed KEA have the potential to be impacted by temporary drawdown of the OZ aquifer. The most significant estimated drawdown occurs in the Wesley #1 well located in the SWSW Section 8, T53N, R67W. As shown in Table 4.4-1, the maximum estimated drawdown at this well is 73.2 feet or 93.8% of the available head. This well supplies water to a residence and to livestock. Several factors should be noted when considering this potential impact. First, the well is located along the Little Missouri River flood plain immediately adjacent to the no-flow boundary of the groundwater model. As such, the drawdown predicted at the well may be over-estimated due to edge effects and the inherent numerical

instability of the modeling equations with adjacent dry cells. Second, geological data are limited in the vicinity of the Wesley #1 well. Therefore, it was not possible to confirm the geologic interval in which the well is completed. Based on WSEO records, there is a strong possibility that this well may be completed in the Little Missouri River alluvium, in which case it is unlikely that the well would be impacted by ISR operations. The predicted drawdown included in this modeling effort for the Wesley #1 well is considered to be a conservative analysis. Model-predicted impacts at the Strong wells (Strong #1 and Robinson #4), Reynolds #6 and AR-1 well were less: 22.4%, 38.6%, and 29.4% of the available head, respectively. Since all of the wells are located close to the outcrop and hence the edge of the model, potential impacts to these wells also may be overestimated due to model edge effects. Nevertheless, in all cases the estimated drawdown is not expected to materially affect the well yields.

Several factors contribute to the conservative nature of the drawdowns derived from the model simulations. First, the model simulation assumed the same production (1.25%) and restoration bleed (3.0%) throughout the entire mine progression regardless of adjacent hydrologic conditions. It may be possible to optimize the bleed rates to minimize drawdowns after taking into account adjacent hydrologic conditions. Second, restoration simulations for the groundwater sweep phase did not selectively target areas identified as requiring this method of restoration. Rather, withdrawals from the aquifer were spread across the production centers uniformly at the conservatively high recovery rate. A targeted sweep would reduce the total amount of water removed from the aquifer, hence reducing the potential impacts.

Potential impacts to the quantity of water in the DM interval during operations were not modeled. However, given the limited use of this interval (the 22X-19 is the only known well within the proposed KEA or Ross license areas that is completed in the DM interval, and that well also is completed in the OZ aquifer as described in Section 3.4.3.2.1 of this ER), limited hydraulic conductivity and yield, the probability of impacts to this system are small if not negligible.

In summary, while predicted water quantity impacts to the SM and OZ aquifers were apparent in the conservative uranium recovery and aquifer restoration simulations, potential impacts would be localized and short-lived as demonstrated through the modeling effort. Recovery of the OZ aquifer would

be largely achieved within 15 years, even under the conservative scenario presented. Figure 4.4-4 depicts the estimated drawdowns after 15 years of recovery following aquifer restoration. At this point in time, most of the wellfield area is predicted to have near full recovery to pre-operational levels, with the remainder within approximately 10 to 20 feet. As shown on Figure 4.4-4, the model-predicted drawdowns within the Ross license area are higher; however, a second model simulation with no ISR operations indicated that up to 15 feet of the drawdown is attributed to water removed from EOR wells. Therefore, roughly about half of the drawdown shown on Figure 4.4-4 is attributed to ISR operations. Most importantly, in the event that Strata's activities prevent full use of a well, Strata commits to providing an alternate source of water of equal or better quality and quantity subject to Wyoming State water law.

4.4.2.3 Potential Aquifer Restoration Impacts

Pursuant to LC 10.6 of SUA-1601, Strata will restore the groundwater to the numerical groundwater protection standards as required by 10 CFR Part 40, Appendix A, Criterion 5B(5). The aquifer restoration methods for the Proposed Action are the same as for the Ross ISR Project and include the following:

1. Groundwater Sweep (targeted or selective),
2. Groundwater Transfer,
3. Reverse Osmosis Treatment with Permeate Injection,
4. Groundwater Recirculation, and
5. Stability Monitoring.

Potential impacts to groundwater quality and quantity during aquifer restoration will be similar to the potential impacts described for the operation phase.

4.4.2.3.1 SA Water Quality and Quantity

During aquifer restoration, leaks from pipelines, spills at the surface and shallow Class III injection well integrity issues could potentially impact surficial aquifer water quality, although potential impacts will be less than those occurring during operations since no lixiviant or recovery solutions will be

present. Mitigation measures described in Section 5.4.2 of this ER will reduce the potential impacts to the shallow aquifer within the proposed KEA.

4.4.2.3.2 SM, OZ, and DM Water Quality and Quantity

The potential impacts to water quality of the deeper, confined aquifers during aquifer restoration are similar to those discussed in Section 4.4.2.2.3 of this ER. The natural conditions present that work to protect adjacent, non-exempted aquifers will continue to prevent impacts to the water quality of these systems. In addition, through monitoring, instrumentation and control along with data capture and analysis, potential impacts during aquifer restoration will be minimized. During restoration of the exempted aquifer, adjacent aquifers will be protected to their class of use and to applicable MCLs per EPA requirements in 40 CFR Part 141 and WDEQ/LQD requirements. In addition, several factors contribute to decreasing the potential for groundwater quality impacts during aquifer restoration: a) the injection and recovery flow rates are lower during aquifer restoration compared to operation, b) the duration that each wellfield module will undergo aquifer restoration is typically much lower than the duration of uranium recovery operations, c) the production zone water quality will improve throughout active restoration, d) during operations permeate will be continuously added to the lixiviant stream to maintain water quality in the exempted aquifer, and e) most importantly, excursion monitoring will continue during aquifer restoration.

4.4.2.4 Potential Decommissioning Impacts

Following regulatory approval of restoration of the exempted portions of the OZ aquifer, decommissioning of wellfield infrastructure would commence. These activities would include removal of any downhole equipment and abandonment of all injection, recovery and monitor wells.

4.4.2.4.1 Potential Decommissioning Impacts to Surficial Aquifer Water Quality and Quantity

During decommissioning, the potential impacts to surficial aquifers within the proposed KEA will similar to the construction phase and include potential spills and leaks from construction equipment. Mitigation measures described in Section 5.4.2 of this ER will lessen the potential surficial aquifer quality impacts, including adherence to the SWPPP.

4.4.2.4.2 Potential Decommissioning Impacts to the SM, OZ and DM Aquifers

During decommissioning, the primary mechanism for either a potential water quality or quantity impact will be from improper plugging of the Class III injection and recovery wells. Similar to the Ross ISR Project, Strata will plug and abandon all wells following NRC and WDEQ/LQD approval. Since the wells would be plugged and abandoned in accordance with the procedures described in Ross TR Addendum 2.6-E, which comply with Wyoming Statute WS35-11-404 and Chapter 8, Section 8 of the WDEQ/LQD Rules and Regulations, potential decommissioning impacts to the SM, OZ and DM aquifer are expected to be small.

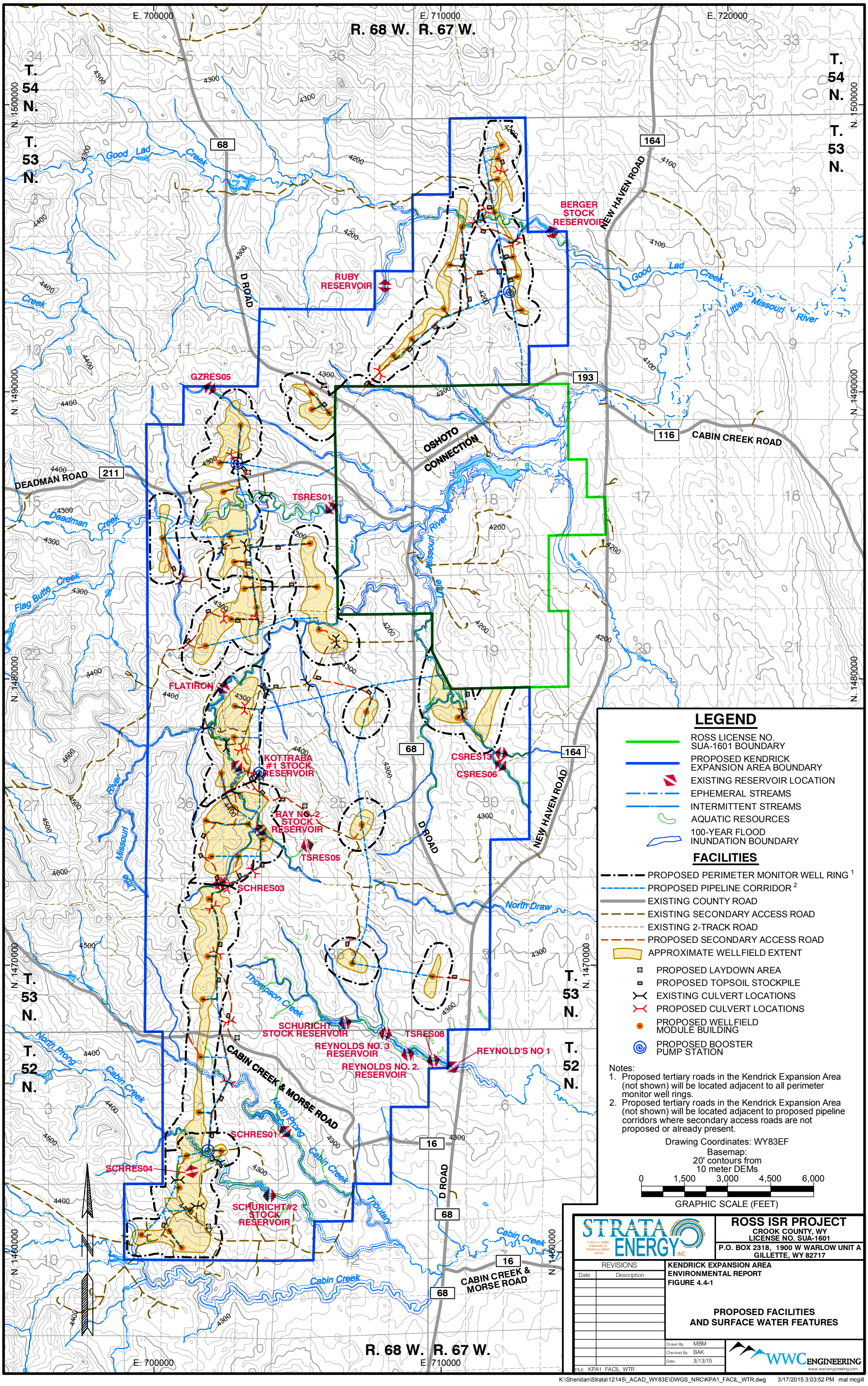
4.4.3 No Action Alternative

Under the No Action Alternative, the Ross ISR Project license would not be amended and surface water, aquatic resources, and groundwater within the proposed KEA would not be impacted by ISR activities.

Table 4.4-1. Summary of Modeled Aquifer Water Quantity Impacts

Well	Northing[1]	Easting[1]	Layer	Use	Drawdown (ft)[2]	Estimated Available Head[3]	Drawdown as % of Available Head
Strong Well	714963	1483356	6 (OZ)	Domestic/ stock	53.3	238	22.4
Reynolds #6	710994	1466388	6 (OZ)	Domestic/ stock	35.5	92	38.6
Sophia #1A	700454	1484209	6 (OZ)	Oilfield	68.0	526	12.9
Kiehl Water Well #2	712425	1474729	4 (SM) & 6 (OZ)	Oilfield	24.2 (SM) 47.2 (OZ)	48 (SM) 182 (OZ)	50.4 (SM) 25.9 (OZ)
22X-19	710876	1481933	6 (OZ)	Oilfield	-60.9	308	-19.8
19XX State	711658	1483961	6 (OZ)	Oilfield	71.5	371	19.3
789V State	710930	1484055	6 (OZ)	Oilfield	95.0	317	30.0
Kiehl Water Well #1	713762	1473698	6 (OZ)	Oilfield	46.7	332	14.1
WSW#1 West Kiehl Unit	707029	1471267	6 (OZ)	Oilfield	62.1	270	23.0
Wesley #1 (P103666W)	715506	1489632	6 (OZ)	Domestic/ stock	73.2	78	93.8
Edsel WSW #2	700419	1507387	6 (OZ)	Oilfield	2.5	400	6.3
Cambridge WSW #1	691349	1476434	6 (OZ)	Oilfield	7.0	650	1.1
Lily #1	697631	1503408	6 (OZ)	Oilfield	5.2	400	1.3
Brislawn WSW #1	704161	1503518	6 (OZ)	Oilfield	13.0	400	3.3
AR-1	714933	1478287	6 (OZ)	Stock	48.2	164	29.4
Federal Schuricht #2	702281	1459157	6 (OZ)	Oilfield	38.9	790	4.9
Mellott Ranch WS #3	700141	1460541	6 (OZ)	Oilfield	64.1	681	9.4
Mellott Ranch WS-2	700898	1459125	4 (SM)	Oilfield	11.9	440	2.7

[1] NAD 83 Wyoming East coordinate system.
[2] All drawdowns calculated from estimated 2015 potentiometric surface.
[3] Available head represents the best estimate of head available above the top of the aquifer prior to well construction and is primarily estimated from WSEO well completion data.


R. 68 W.
R. 67 W.
E. 700000
E. 710000
E. 720000
N. 1500000
N. 1490000
N. 1480000
N. 1470000
N. 1460000
T. 54 N.
T. 53 N.
T. 52 N.
68
164
193
116
211
16
D ROAD
NEW HAVEN ROAD
CABIN CREEK ROAD
DEADMAN ROAD
OSHOTO CONNECTION
CABIN CREEK & MORSE ROAD
Good Lad Creek
Little Missouri River
Missouri River
Deadman Creek
Flag Butte Creek
North Draw
Thompson Creek
North Prong
Cabin Creek
Tributary
RUBY RESERVOIR
BERGER STOCK RESERVOIR
GZRES05
TSRES01
FLATIRON
KOTTRABA #1 STOCK RESERVOIR
RAY NO. 2 STOCK RESERVOIR
TSRES05
SCHRES03
SCHURICHT STOCK RESERVOIR
REYNOLDS NO. 3 RESERVOIR
REYNOLDS NO. 2. RESERVOIR
TSRES08
REYNOLD'S NO 1
SCHRES01
SCHRES04
SCHURICHT #2 STOCK RESERVOIR
CSRES13
CSRES06
LEGEND
ROSS LICENSE NO. SUA-1601 BOUNDARY
PROPOSED KENDRICK EXPANSION AREA BOUNDARY
EXISTING RESERVOIR LOCATION
EPHEMERAL STREAMS
INTERMITTENT STREAMS
AQUATIC RESOURCES
100-YEAR FLOOD INUNDATION BOUNDARY
FACILITIES
PROPOSED PERIMETER MONITOR WELL RING 1
PROPOSED PIPELINE CORRIDOR 2
EXISTING COUNTY ROAD
EXISTING SECONDARY ACCESS ROAD
EXISTING 2-TRACK ROAD
PROPOSED SECONDARY ACCESS ROAD
APPROXIMATE WELLFIELD EXTENT
PROPOSED LAYDOWN AREA
PROPOSED TOPSOIL STOCKPILE
EXISTING CULVERT LOCATIONS
PROPOSED CULVERT LOCATIONS
PROPOSED WELLFIELD MODULE BUILDING
PROPOSED BOOSTER PUMP STATION
Notes:
1. Proposed tertiary roads in the Kendrick Expansion Area (not shown) will be located adjacent to all perimeter monitor well rings.
2. Proposed tertiary roads in the Kendrick Expansion Area (not shown) will be located adjacent to proposed pipeline corridors where secondary access roads are not proposed or already present.
Drawing Coordinates: WY83EF
Basemap: 20' contours from 10 meter DEMs
0 1,500 3,000 4,500 6,000
GRAPHIC SCALE (FEET)
STRATA ENERGY INC
A WHOLLY-OWNED SUBSIDIARY OF PENINSULA ENERGY LIMITED
ROSS ISR PROJECT
CROOK COUNTY, WY
LICENSE NO. SUA-1601
P.O. BOX 2318, 1900 W WARLOW UNIT A
GILLETTE, WY 82717
REVISIONS
Date Description
KENDRICK EXPANSION AREA
ENVIRONMENTAL REPORT
FIGURE 4.4-1
PROPOSED FACILITIES AND SURFACE WATER FEATURES
Drawn By: MBM
Checked By: BAK
Date: 3/13/15
FILE: KPA1_FACIL_WTR
WWC ENGINEERING
www.wwcengineering.com
K:\Sheridan\Strata\12145_ACAD_WY83E\DWGS_NRC\KPA1_FACIL_WTR.dwg 3/17/2015 3:03:52 PM mal mcgill

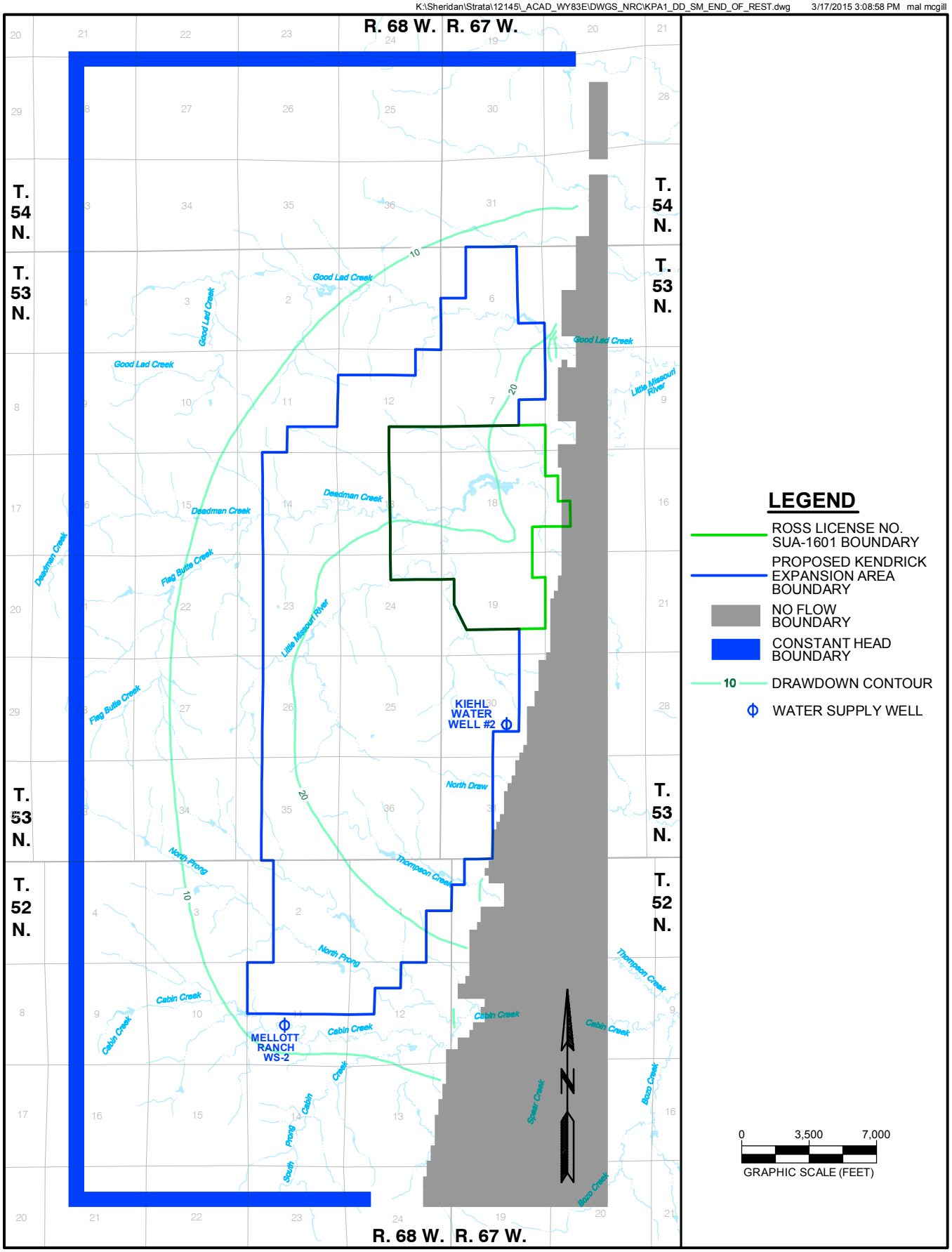


Figure 4.4-2. SM Aquifer Drawdown at End of Aquifer Restoration Phase.

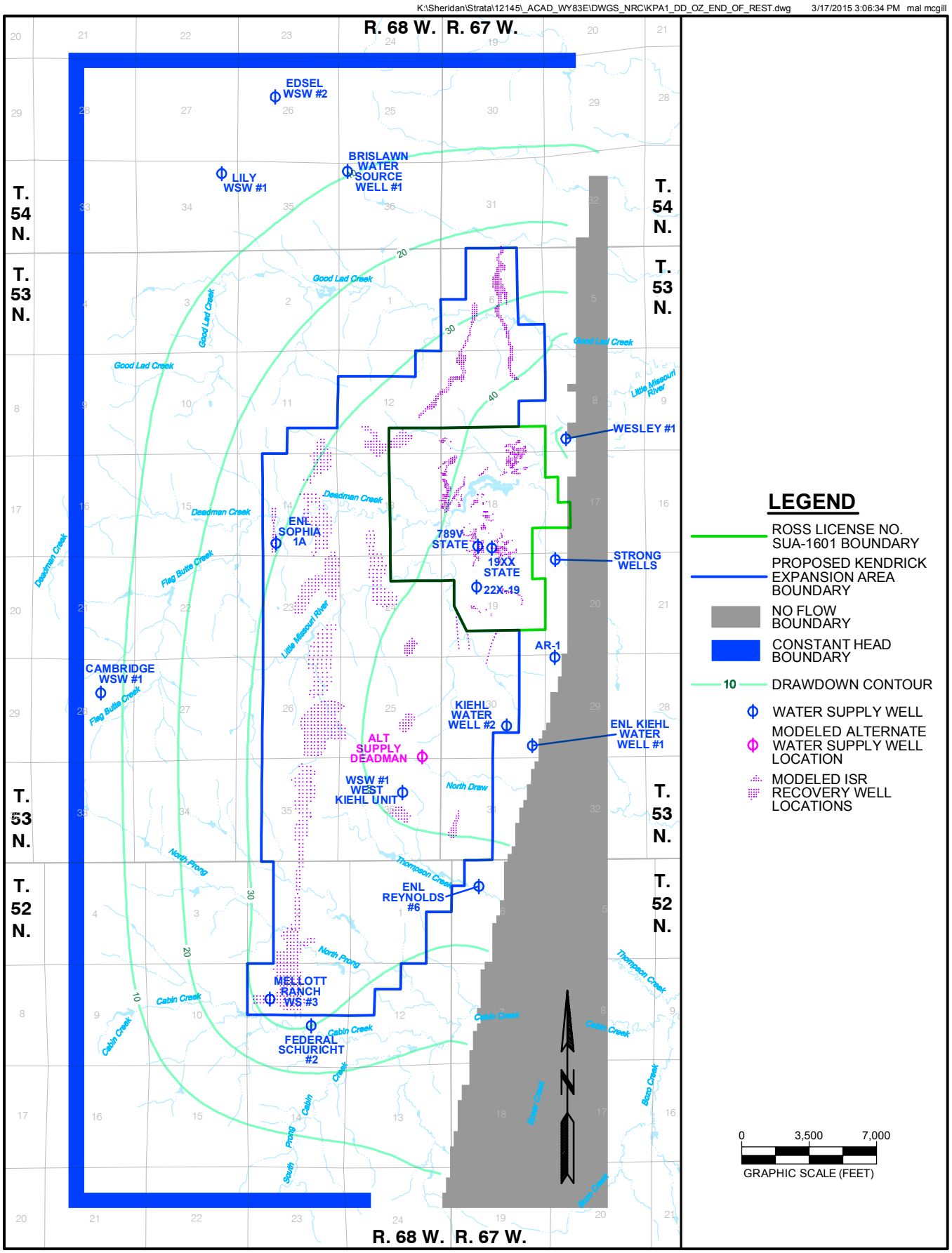


Figure 4.4-3. OZ Aquifer Drawdown at End of Aquifer Restoration Phase.

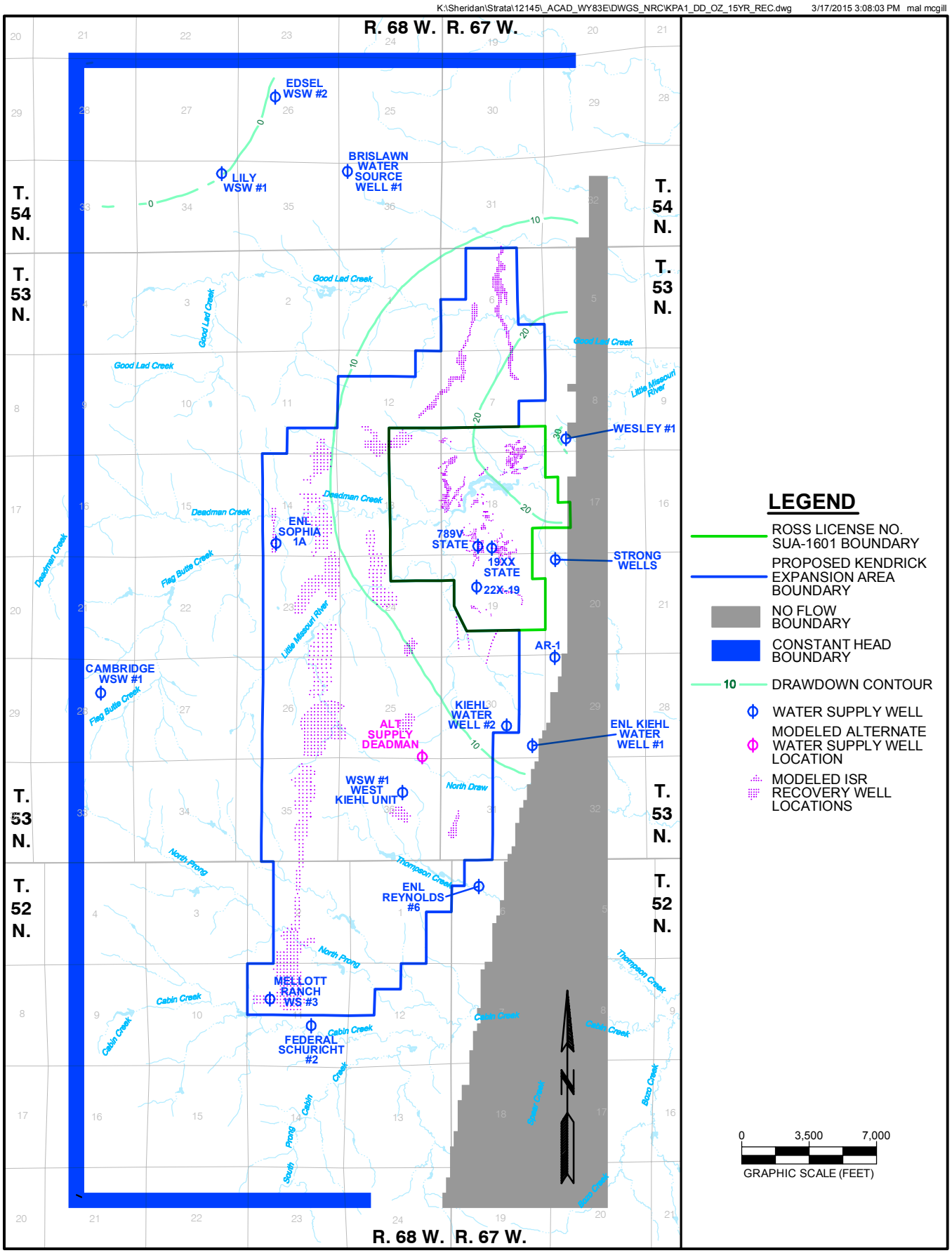


Figure 4.4-4. OZ Aquifer Drawdown after 15 Years of Recovery.

4.5 Potential Ecological Resources Impacts

4.5.1 Proposed Action

The Proposed Action would extend the duration and expand the area of the potential ecological resources impacts approved for the Ross ISR Project. As indicated in Ross ER Section 4.5.1, the type of disturbance associated with uranium ISR will not result in large expanses of habitat being dramatically transformed from its original character as in conventional mining and milling operations. Section 4.1 of this ER states that Strata will disturb approximately 1,050 acres (approximately 13%) of the proposed KEA, with all disturbed areas either reclaimed at the completion of construction or during decommissioning.

4.5.1.1 Potential Construction Impacts

4.5.1.1.1 Terrestrial Ecology

4.5.1.1.1.1 Vegetation

Under the Proposed Action, wellfield modules, booster pump stations, access roads, pipelines, and utilities would be constructed within the five vegetation communities in the proposed KEA (Upland Grassland, Sagebrush Shrubland, Pastureland, Hayland and Wooded Draw).

As described in Ross ER Section 4.5.1.1, potential direct impacts include the short-term loss of vegetation (modification of structure, species composition, and areal extent of cover types). Potential indirect impacts include the short-term and long-term increased potential for non-native species invasion, establishment, and expansion; exposure of soils to accelerated erosion; shifts in species composition or changes in vegetative density; reduction of wildlife habitat; reduction in livestock forage; and changes in visual aesthetics. An estimated 1,050 acres of the proposed KEA would be affected by surface disturbance under current development plans. Potential impacts to vegetation would be highest during the construction phase when most of the surface disturbance will occur. As described in Section 3.5 of this ER, most (56%) of the proposed KEA is currently covered with perennial grasses and classified as Upland Grassland. Over half of the anticipated disturbance will occur on this vegetation type, primarily due to wellfield module and access road construction.

During construction, increased soil disturbance and higher traffic volumes relative to other project phases could stimulate the introduction and spread of undesirable and invasive, non-native species within the proposed KEA. Non-native species invasion and establishment has become an increasingly important result of previous and current disturbance in Wyoming. These species often out-compete desirable species, including special-status species, rendering an area less productive as a source of forage for livestock and wildlife. Additionally, sites dominated by invasive, non-native species often have a different visual character that may negatively contrast with the surrounding undisturbed vegetation. Strata will restore and re-seed much of the disturbed area within a single construction season and conduct weed control as needed to limit the spread of undesirable and invasive, non-native species on disturbed areas.

No threatened or endangered vegetation species were observed within the proposed KEA; therefore, no impacts are anticipated. Mitigation measures designed to prevent or reduce potential impacts to vegetation are discussed in Section 5.5 of this ER. These include temporary and permanent revegetation of disturbed areas with seed mixtures appropriate for the affected vegetation types.

Habitat alteration, fragmentation, and loss of cover and forage are expected to occur to varying degrees as a result of the Proposed Action. Sagebrush Shrubland, the second largest vegetation type in the proposed KEA (31% of the total), can be difficult and time-consuming to reestablish. Consequently, pre-reclamation vegetation communities (i.e., shrub-steppe) may be different than post-construction communities (i.e., grass-dominated) for several years, or possibly decades, which could alter the composition and abundance of both plant and wildlife species in the area. Reclamation or regeneration of native shrub species could be hindered further by year-long grazing pressure. Large ungulates (wild and domestic) are attracted to the more succulent and younger plants, and often concentrate in newly seeded locations during the critical early-growth stage. Potential impacts to the Sagebrush Shrubland vegetation type will be reduced or avoided by minimizing surface disturbance where possible, providing a temporary seed mixture to prevent invasion of non-native species in disturbed areas, restoring sagebrush and other shrubs on reclaimed lands, and by conducting all revegetation activities

in accordance with the approved Reclamation Plan of Strata's WDEQ/LQD Permit to Mine No. 802.

4.5.1.1.1.2 Wildlife and Fisheries

Similar to the Ross ISR Project, potential impacts resulting from construction under the Proposed Action include short-term (until successful decommissioning is achieved) and long-term (persisting beyond successful completion of decommissioning) impacts. Indirect impacts typically affect more than a single individual and often persist longer than direct impacts. Direct, project-related impacts of construction may be experienced by all wildlife species to varying degrees. Individuals may be injured or killed due to collisions with drilling and/or heavy construction equipment and related traffic. Topsoil stripping required for construction of drill pads, access roads, and other infrastructure may also result in injury and mortality to some wildlife species, particularly small and young burrowing species such as rodents and herptiles that have limited mobility to escape the equipment.

Noise, dust, and human and mechanical presence would all be considered indirect effects. These elements can cause wildlife to avoid the disturbance area within their territories and/or result in their displacement into adjoining habitats. The latter result can negatively impact both the animals leaving the affected area as well as the population of animals upon which newly displaced individuals encroach.

Big Game

No crucial big game habitats or migration corridors are recognized by the WGFD in the proposed KEA or surrounding 1 mile perimeter. Big game observed in the proposed KEA in 2013 included pronghorn, mule deer, and white-tailed deer. During construction, when disturbance activities will be the greatest, big game could be displaced from portions of the proposed KEA. Overcrowding can result in increased competition for limited resources, which could result in starvation and/or dehydration. Increased stress associated with overcrowding can also lead to physical altercations, resulting in injuries or fatalities. Mitigation measures discussed in Section 5.5 of this ER will help ensure that potential impacts to big game are small.

Other Mammals

No specific surveys for other mammals were conducted in 2013; however, 23 mammal species have been documented within or near the proposed KEA. Potential construction-related impacts to other mammals within the proposed KEA primarily would involve destruction of individuals/habitat as a result of construction activities and increased public access. Overcrowding can result in increased competition for limited resources, which could result in starvation and/or dehydration. Increased stress associated with overcrowding can also lead to physical altercations, resulting in injuries or fatalities. Due to limited disturbance and implementation of mitigation measures discussed in Section 5.5 of this ER, potential impacts to other mammals are anticipated to be small.

Raptors

Eleven intact raptor nests (ferruginous hawk, red-tailed hawk, and great horned owl) were recorded within the proposed KEA in 2013 (Figure 3.5-3 of this ER). An additional three nests no longer intact were also found within the proposed KEA. In addition, seven intact nests and one nest no longer intact were located within 1 mile of the project boundary.

Six raptor species on the USFWS list of Birds of Conservation Concern (bald eagle, Swainson's hawk, ferruginous hawk, golden eagle, prairie falcon, and short-eared owl) have been observed within or near the proposed KEA (Addendum 3.5-B). Of these, the Swainson's and ferruginous hawks are the only species known to nest in the area. Potential impacts to raptors within the proposed KEA include: (1) nest desertions or reproductive failure as a result of proposed project activities and increased public access; (2) temporary reductions in prey populations; and (3) mortality associated with roads. The nests within the proposed KEA will not be directly disturbed, so nesting raptors would not be directly displaced by the Proposed Action, and foraging raptors could potentially avoid the disturbance area. Due to limited disturbance and implementation of mitigation measures discussed in Section 5.5 of this ER, potential impact to raptors are anticipated to be small.

Upland Game Birds

Four species of upland birds (mourning dove, wild turkey, sharp-tailed grouse and sage-grouse) were observed in 2013 in the wildlife survey study area. Potential construction-related impacts to upland game birds within the

proposed KEA include: (1) nest destruction/desertions or reproductive failure as a result of proposed project activities and increased public access; and (2) mortality associated with roads.

As described in Sections 3.5.4.2.5 and 3.5.4.3 of this ER, there are no sage-grouse core areas or connectivity areas within or near the proposed KEA. Nor were any sage-grouse broods, brood-rearing areas, or wintering areas identified during the 2013 field surveys. Two sage-grouse leks (Oshoto and Cap'n Bob) have been identified approximately 2 miles from the proposed KEA. Male sage-grouse were observed at each lek during the 2013 surveys.

Due to the relatively small disturbance and implementation of mitigation measures described in Section 5.5 of this ER, potential impacts to upland game birds are anticipated to be small.

Nongame/Migratory Birds

Eighteen nongame or migratory species on the USFWS Bird of Conservation Concern list could potentially occur within the proposed KEA as described in Section 3.5.4.2.9 of this ER. Of these, six have been observed within or near the area (Addendum 3.5-B).

Passerine bird (breeding bird) surveys were conducted within the proposed KEA. Transects were placed in three habitat types (Upland Grassland, Sagebrush Shrubland, and Pastureland). The May and June 2013 surveys revealed 13 species as discussed in Section 3.5.4.2.6 of this ER.

Potential impacts to nongame/migratory birds within the proposed KEA include: (1) nest destruction/desertions or reproductive failure as a result of proposed project activities and increased public access; and (2) mortality associated with roads. Due to limited disturbance and implementation of mitigation measures discussed in Section 5.5 of this ER, potential impacts to nongame and migratory species are anticipated to be small.

Reptiles, Amphibians, and Fish

Two frog species (leopard frog and chorus frog) were recorded within the proposed KEA during the vocalization surveys, as described in Section 3.5.4.2.8 of this ER. The leopard frogs were also commonly found during the walking surveys. No fish species are present within the proposed KEA.

Potential impacts to reptiles, amphibians, and fish within the proposed KEA would primarily involve destruction of individuals/habitat as a result of proposed project activities and increased public access. Sediment load from surface disturbing activities could also potentially impact aquatic habitat, although potential impacts will be greatly reduced through sediment control BMPs. Up to 8 acres of aquatic resources could be disturbed as a result of the Proposed Action; however, all wetland disturbance would be mitigated in accordance with USACE requirements. Due to limited disturbance and implementation of mitigation measures discussed in Section 5.5 of this ER, potential impacts to reptiles, amphibians, and fish are anticipated to be small.

4.5.1.1.2 Threatened or Endangered (T&E) Species

As described in Section 3.5.4.3 of this ER, the USFWS has listed two individual wildlife species and one individual plant species for Crook County, Wyoming as of December 2013. The wildlife species listed are the sage-grouse (Candidate) and northern long-eared bat (Proposed). The plant species listed is the threatened Ute Ladies'-tresses. T&E species and other wildlife species surveys were conducted during February through September 2013. There are no sage-grouse leks within the proposed KEA. The potential habitat for the Ute ladies'-tresses orchid was surveyed in August 2013, but no orchids were found. Due to limited disturbance and implementation of mitigation measures discussed in Section 5.5 of this ER, potential impacts to T&E species are anticipated to be small.

4.5.1.2 Potential Operation Impacts

Operation activities may directly and indirectly impact terrestrial ecology within the proposed KEA. Access to portions of the wellfield modules will be limited by fencing. Vehicle collisions with wildlife could occur on access roads and existing roads. Since most potential terrestrial ecology impacts are caused by surface disturbance, potential impacts from operation would be much less than potential construction impacts.

During operation, the soils within the proposed KEA may become temporarily contaminated or altered due to unanticipated operational leaks and spills. This could potentially impact vegetation in affected areas. Any spill/leak impacts would be minimized by implementation of a spill response

plan and by restoring and re-seeding areas where contaminated soil has been removed.

During the operation phase, noise and vehicular activity will be reduced within the proposed KEA compared to the construction phase. The majority of vehicular activity will be confined to the New Haven Road and the area around the Ross CPP. The decreased vehicular traffic should decrease the risk of vehicular collisions and reduce noise, which would reduce potential disruptions to wildlife populations.

During operation, Strata will implement mitigation measures to reduce potential impacts to ecological resources as described in Section 5.5 of this ER, including implementing spill response procedures and restoring and re-seeding disturbed areas.

4.5.1.3 Potential Aquifer Restoration Impacts

During aquifer restoration, vegetation will continue to have the potential to be impacted by spills and leaks, and wildlife will continue to have the potential to be impacted by noise, dust, and vehicles. However, due to the limited disturbance and implementation of mitigation measures discussed in Section 5.5 of this ER, potential impacts to ecological resources during aquifer restoration are anticipated to be small.

4.5.1.4 Potential Decommissioning Impacts

Potential ecological impacts will temporarily increase during decommissioning due to higher levels of surface disturbance, traffic, and use of heavy equipment compared to the operation and aquifer restoration project phases. Potential impacts are expected to be similar to but less than those occurring during construction, due to a smaller workforce. These include short-term loss of vegetation and habitat in disturbed areas, non-native species invasion, aquatic habitat impacts from sediment loading, habitat fragmentation, wildlife displacement due to noise, dust, and human/mechanical presence, and vehicle collisions with wildlife. Potential impacts are expected to be small due to the relatively small total disturbance area (approximately 13% of the proposed KEA) and mitigation measures specific to decommissioning, including habitat restoration in all areas of the

proposed KEA disturbed during construction, operation, aquifer restoration, and decommissioning.

4.5.2 No Action Alternative

Under the No Action Alternative, the Ross ISR Project license would not be amended and ISR wellfields and associated infrastructure within the proposed KEA would not be constructed. The vegetation and wildlife within the proposed KEA would not be directly or indirectly affected by ISR activities.

4.6 Potential Air Quality Impacts

4.6.1 Proposed Action

The Proposed Action would extend the duration and expand the area of the potential air quality impacts approved for the Ross ISR Project. Similar to the Ross ISR Project, potential air quality impacts within the proposed KEA will be associated with combustion and fugitive dust emissions. Strata received an air quality permit (No. CT-12198) from the WDEQ/AQD for the Ross ISR Project in 2011. As described in Section 4.2 of this ER, Strata also has executed an MOU with Crook County which includes provisions for fugitive dust control.

As part of the Proposed Action, Strata will amend the air quality permit to include the proposed KEA. The amendment application will include the following:

- Expand the permit boundary to include the proposed KEA.
- Map locations of potential new emission sources.
- Incorporate baseline radiological monitoring results (Section 3.11 of this ER).
- Update the disturbed acreage and associated wind erosion emissions by year.
- Account for any change in vehicles miles traveled.

Since the Ross ISR Project is covered under an air quality permit and potential air quality impacts associated with the Proposed Action will be similar to the Ross ISR Project, an emissions inventory was not completed for the Proposed Action. The following provides a discussion of potential air quality impacts by phase for the Proposed Action.

4.6.1.1 Potential Construction Impacts

During the construction phase, the greatest potential for air quality impacts stems from fugitive dust generated from heavy equipment (cranes, bulldozers, graders, excavators, trenchers, loaders, etc.) used to construct wellfield modules and access roads. Large particles will also be released by

wind blowing over disturbed areas and stockpiles. Emissions associated with land-disturbing activities and vehicle traffic during construction will be short-term and reduced through implementation of BMPs described in Section 5.6 of this ER (e.g., speed limit controls, strategically placing water loadout facilities, prompt revegetation, and use of dust inhibitors such as magnesium chloride). Fugitive dust also has the potential to impact visual resources as described in Section 4.9 of this ER.

Another source of potential air quality impacts during construction is combustion emissions. During construction of the wellfield modules, diesel emissions will be emitted from drill rigs, diesel-powered water trucks and other heavy equipment. Additional heavy equipment will be used to construct the access roads. In addition, employee vehicles and trucks will also emit fuel combustion products. As stated in Section 4.2 of this ER, the Proposed Action will not increase the maximum of 200 people anticipated for the construction phase of the Ross ISR Project. In addition, the maximum rate of material shipments is not anticipated to increase under the Proposed Action. During construction, 1,050 acres or about 13% of the proposed KEA will be disturbed. Section 5.6 of this ER describes Strata's proposed mitigation measures to reduce or eliminate potential air quality impacts including amending the air quality permit to include the proposed KEA, implementing dust control measures, and promptly revegetating disturbed areas.

4.6.1.2 Potential Operation Impacts

Nonradiological emissions during operation will include fugitive dust and vehicle combustion emissions, although both sources would be significantly less than during construction due to lower traffic volumes and less surface disturbance. Additional nonradiological emissions would include gaseous effluents such as oxygen and carbon dioxide from the wellfield modules. Since the proposed KEA will not include a processing facility or lined retention ponds, radiological emissions will be limited to radon-222 in the wellfield modules as described in Section 4.12 of this ER.

4.6.1.3 Potential Aquifer Restoration Impacts

Potential air quality impacts during aquifer restoration will be similar to the operation phase. During aquifer restoration, potential impacts will be limited to combustion emissions and fugitive dust in the wellfields and will

decrease as aquifer restoration is completed. Since fewer employees and activities are needed during aquifer restoration, both combustion emissions and fugitive dust are anticipated to be the lowest of the four project phases.

4.6.1.4 Potential Decommissioning Impacts

Potential impacts to air quality during the decommissioning phase will be similar to the construction phase. Since no processing facilities or lined retention ponds will be constructed within the proposed KEA, potential air quality impacts would be limited to decommissioning of the wellfield modules, access roads, module buildings, booster pump stations, and other infrastructure.

4.6.2 No Action Alternative

Under the No Action Alternative, the Ross ISR Project license would not be amended and ISR wellfields and associated infrastructure within the proposed KEA would not be constructed. Air quality within the proposed KEA would not change due to licensed activities associated with the Proposed Action.

4.7 Potential Noise Impacts

4.7.1 Proposed Action

The Proposed Action would extend the duration and expand the area of the potential noise impacts approved for the Ross ISR Project. Due to the remote location of the proposed KEA and low number of nearby receptors, potential noise impacts are expected to be small. As discussed in Section 3.7 of this ER, there are no residences within the proposed KEA, but there are 16 residences within the surrounding 2-mile radius. Three of the residences are located within 0.5 mile of the proposed KEA and would be most likely to be impacted by increased noise. The nearest residence is 475 feet from the proposed KEA boundary, near the northeast corner of the existing Ross ISR Project license boundary.

The following describes the predicted noise levels and potential noise impacts during construction, operation, aquifer restoration, and decommissioning.

4.7.1.1 Potential Construction Impacts

Potential noise impacts during construction will result from heavy equipment operation within the proposed KEA. Strata does not anticipate increased traffic on affected county roads, since construction activities within the proposed KEA will be completed by a "wellfield crew" of approximately 25 people, which will carry over from the Ross ISR Project, as stated in Section 4.2.1.1 of this ER. Noise resulting from construction activities within the proposed KEA will be similar to that approved for the Ross ISR Project, except that processing facilities, lined retention ponds, and deep disposal wells will not be constructed within the proposed KEA. The following describes the potential noise impacts to residents and potential impulse or impact noises.

4.7.1.1.1 Potential Noise Impacts to Residents

Potential noise impacts to nearby residences depend on the distance from the noise source. As described in Ross ER Section 4.7.1.1, noise from point sources diminishes about 6 dBA for each doubling of distance according to the following equation (Bell and Bell 1994):

$$L_{p,1} - L_{p,2} = 20 \log\left(\frac{r_2}{r_1}\right)$$

In this equation $L_{p,1}$ and $L_{p,2}$ are the sound pressure levels at points 1 and 2, respectively. This equation shows that doubling the distance from a point source decreases the noise level at the receptor by approximately 6 dBA.

Using this relationship, the maximum estimated noise level related to construction equipment was calculated for the nearest residence. Table 4.7-1 shows the estimated noise levels for construction equipment 1,462 feet away, which is the minimum distance between a planned perimeter monitor well in the proposed KEA and a nearby residence. The table shows that the maximum estimated noise level at a nearby residence, resulting from a drill rig operating at the closest potential well location, would be below the nuisance level of 55 dBA. In general, noise originating from construction equipment would be apparent locally over the short term where construction activities are occurring.

4.7.1.1.2 Impulse or Impact Noises

29 CFR § 1910.95(b)(1) defines continuous noise as that with variation in noise level maxima at intervals of 1 second or less. Noises not meeting this definition are considered impulse or impact noises. Impulse or impact noises may be present during some phases of the Proposed Action. The sources of the impulse/impact noises may include impact wrenches, pneumatic attachments on excavating machines used to break rock, and incidental construction-related noises. If present, these impulse/impact noises primarily would occur during the construction and decommissioning phases and would be short in duration. The primary locations of the noise would be associated with the wellfield modules, booster pump stations, and associated infrastructure, which would be more than 1,462 feet from the nearest residence.

Members of the public would not be exposed to potentially damaging noise levels, including impulse/impact noises. In addition, Strata would implement a hearing conservation program for Strata employees and contractors to minimize or prevent potential impacts from occupational noise during construction. The hearing conservation program will ensure that exposure to impulse/impact noise would never exceed 140 dBA peak sound pressure level in accordance with 29 CFR § 1910.95(b)(2).

4.7.1.2 Potential Operation Impacts

Noise sources specifically resulting from operation include wellfield equipment, especially MIT and work over operations. Wellfield equipment will be contained within module buildings and booster pump stations, and well pumps would be submerged. Within the proposed KEA, the amount of heavy equipment operation during the operation phase will be much less than during construction and will be limited primarily to MIT, work over operations, and continued wellfield development.

4.7.1.3 Potential Aquifer Restoration Impacts

During aquifer restoration, the only potential sources of noise within the proposed KEA will be associated with ongoing activities in the wellfields. Potential noise impacts will continue to be temporary and intermittent.

4.7.1.4 Potential Decommissioning Impacts

Within the proposed KEA, potential noise impacts from decommissioning activities will be limited to the wellfields, module buildings, booster pump stations, and access roads. In the wellfield, equipment used during plugging and abandonment of recovery, injection, and monitor wells would produce the greatest source of temporary noise. Cement mixers, compressors, and pumps would be operated for short durations. Similar to the other project phases, potential noise impacts would be short term.

4.7.2 No Action Alternative

Under the No Action Alternative, the Ross ISR Project license would not be amended and ISR wellfields and associated infrastructure within the proposed KEA would not be constructed. Noise levels within the proposed KEA would not change.

Table 4.7-1. Noise Levels for Construction Equipment

Equipment Type	Noise Level at 50 feet[1] (dBA)	Noise Level at 1,462 feet[1] (dBA)
Heavy truck	82-96	53-67
Bulldozer	92-109	63-80
Grader	79-93	50-64
Excavator	81-97	52-68
Concrete Mixer	75-88	46-59
Compressor	73-88	44-59
Backhoe	72-90	43-61
Front Loader	72-90	43-61
Generator	71-82	42-53
Jackhammer/Rock Drill	75-99	46-70
Pump	68-80	39-51
Drill Rig[3]	52-74	23-45

[1] ISR GEIS Table 4.2-1.
[2] Minimum distance between potential perimeter monitor well and nearby residence.
[3] Based on 2010 noise study described in Ross ER Section 3.7. The noise level measured 200 feet from an operating drill rig ranged from 40 to 62 dBA.

4.8 Potential Historic, Cultural, and Paleontological Resources Impacts

4.8.1 Proposed Action

The Proposed Action would extend the duration and expand the area of the potential historic, cultural and paleontological resources impacts approved for the Ross ISR Project. Class I and III inventories were conducted on the proposed KEA as described in Section 3.8.2 of this ER. The results are detailed in confidential Addendum 3.8-A. The Class III pedestrian inventory resulted in the discovery of 45 properties and relocation of 4 previously recorded properties considered significant under Criteria A, C and D (see Section 3.8.2.1 of this ER for criteria). Preliminary recommendations for listing on the NRHP include 4 potentially eligible properties, 30 properties recommended as ineligible, and 11 properties that will require testing to collect sufficient data for evaluation of eligibility. One property eligible under Criterion A (48CK2028) was recorded in 2008, while another property (48CK1466) was determined by SHPO as ineligible in 1993 and has since been destroyed by road construction. Minute paleontological materials were also found on the surface during the Class III inventory. None was found intact, nor were any embedded fossil bones discovered. The few occurrences of paleontological material were recorded as isolated finds and documented accordingly in Addendum 3.8-A.

The Proposed Action has the potential to affect historic properties (those found eligible for NRHP listing) and temporarily limit access to some properties. As described in Section 4.1 of this ER, construction in the proposed KEA could disturb up to 1,050 acres, or about 13% of the total proposed KEA (7,873.7 acres). Strata proposes that the Area of Potential Effect (APE) for direct effects encompass the proposed KEA depicted on Figure 1.3-2 of this ER. This is consistent with the approach taken at AUC, Inc.'s Reno Creek Project and NHPA regulations at 36 CFR § 800.16(d). Further, given the phased and iterative nature of ISR development, Strata proposes that future testing for eligibility for those properties that require additional work and that may be impacted be conducted as necessary prior to initiating construction in that area. Consistent with the Ross ISR Project, Strata is proposing a 3-mile indirect APE for the proposed KEA. Mitigation measures that will be implemented to ensure adverse effects to historic properties are minimized are provided in Section 5.8 of this ER. The following describes the predicted historic and

cultural resources impacts during construction, operation, aquifer restoration and decommissioning.

4.8.1.1 Potential Construction Impacts

Potential impacts to NRHP-eligible historic resources will be greatest during the ground disturbing activities associated with construction. Most properties identified during the Class III inventory are located along the margins of the ephemeral streams in the proposed KEA. The known mineralization in the proposed KEA (Figure 2.1-1 of this ER) is generally linear in nature and trends approximately north-south, while the streams typically trend east-west. In contrast, the mineralization at the Ross ISR Project tends to be more concentrated, less linear and proximal to the Little Missouri River and Deadman Creek drainages. Therefore, the opportunities for potential adverse effects to historic and cultural resources in the proposed KEA are much less than the Ross ISR Project due to decreased overlap between the mineralization and stream drainages that host the majority of potentially eligible historic resources.

The potential direct impacts to historic and cultural resources within the proposed KEA will be related to disturbances associated with installation of monitor, injection and recovery wells along with the associated conveyance systems. In addition, installation of module buildings, booster pump stations, access roads, pipelines and electrical infrastructure would also occur during construction and would have the potential to impact historic properties. LC 9.8 of SUA-1601 includes a stop-work provision along with the Unanticipated Discovery Plan (UDP), which outlines the process of notification and actions should unanticipated cultural resources be found. Other mitigation measures described in Section 5.8 of this ER will ensure impacts to historic and cultural resources are minimized.

Potential indirect impacts may occur in and near the proposed KEA including visual and audible intrusions, increased access to formerly remote or inaccessible resources and impacts to traditional cultural properties. As described in Section 3.8 of this ER, no known or potential Traditional Cultural Properties (TCPs) have been formally identified and recorded to date by studies directly associated with the proposed KEA. Although unlikely, indirect impacts to historic and cultural resources may be unavoidable. However, these will be

temporary, since the entire proposed KEA will be reclaimed and restored to pre-existing land uses during decommissioning.

4.8.1.2 Potential Operation Impacts

Potential impacts to historic and cultural resources during operation could result primarily from maintenance and repair of existing facilities along with continued wellfield development. Overall, impacts to cultural and historical resources during operations would be expected to be less than those during construction, as operations are generally limited to previously disturbed areas (e.g., access roads, wellfield, and pipelines). Implementing the mitigation measures mentioned above and discussed in detail in Section 5.8 of this ER will minimize impacts to cultural resources during the operations phase of the proposed KEA.

4.8.1.3 Potential Aquifer Restoration Impacts

Potential impacts to historic and cultural resources during aquifer restoration will be similar to or less than those expected during operation. Potential impacts primarily would result from surface disturbing activities associated with maintenance and repair of existing facilities. Since new wellfield modules would not be constructed during the aquifer restoration phase without concurrent uranium recovery, the potential impacts would be less than the operation phase with continued wellfield development.

4.8.1.4 Potential Decommissioning Impacts

During decommissioning, surface disturbing activities will temporarily increase, although they would be limited to previously disturbed areas, which will reduce the potential impacts to NRHP-eligible historic properties. Similar to the Ross ISR Project, additional disturbance within the proposed KEA may be required in areas where soil has been contaminated. Strata will adhere to LC 9.8 of SUA-1601 and mitigation measures described in Section 5.8 of this ER to limit potential impacts to historic and cultural resources.

4.8.2 No Action Alternative

Under the No Action Alternative, the Ross ISR Project license would not be amended and ISR wellfields and associated infrastructure within the

proposed KEA would not be constructed. Therefore, potential impacts to historic, cultural and paleontological resources would not occur.

4.9 Potential Visual and Scenic Resources Impacts

4.9.1 Proposed Action

The Proposed Action would extend the duration and expand the area of the potential visual and scenic resources impacts approved for the Ross ISR Project. Similar to the Ross ISR Project, the proposed KEA and surrounding area have been classified by BLM as Class III visual resources management (VRM) areas. The management objective of VRM Class III is to partially retain the existing character of the landscape, while the level of change to the characteristic landscape can be moderate. The existing landscape within the proposed KEA includes rolling pastureland, cultivated cropland, industrial facilities (oil wells, pump jacks, storage tanks, etc.), fences and transportation and utility corridors.

4.9.1.1 Potential Construction Impacts

During construction, potential visual and scenic resources impacts primarily will result from wellfield construction equipment and dust. Wellfield construction would involve the use of drill rigs, water trucks, backhoes, supply trailers, and passenger vehicles. This equipment would be concentrated temporarily at each well location. A typical truck-mounted drill rig, about 30-40 feet tall, would be the most visible piece of equipment used in wellfield construction. Once a well is completed and conditioned for use, the drill rig would be moved to a new location. Strata anticipates that up to 12 drill rigs may be operated at one time during wellfield construction. Drilling primarily would occur during daylight hours; however, it is possible drilling would continue into the night within the limitations discussed in Section 5.7 of this ER for mitigation of potential noise impacts. For nighttime operation, the drill rigs would be lighted, increasing the potential visual impacts.

Dust generated from construction equipment may impact visual resources. Visible dust particles would be released during activities such as the mechanical disturbance of rock and soil materials, bulldozing, and vehicles traveling on gravel roads. Particles also would be transported by wind blowing over the surface of bare land and stockpiles.

To reduce the potential visual and scenic resources impacts within the proposed KEA, Strata would implement the mitigation measures described in Section 5.9 of this ER.

4.9.1.2 Potential Operation Impacts

Potential impacts during operation will result from wellfield activities, continued wellfield development, and the presence of wellhead covers, module buildings, booster pump stations, access roads, buried utilities and power lines. Wellfield activities will include monitor well sampling, module building and booster pump station inspections, and MITs. Some of the facilities and wellfield activities will be visible from the county roads within and near the proposed KEA including the New Haven Road and D Road.

Wellhead covers will be insulated fiberglass boxes approximately 30 to 40 inches high and 30 to 40 inches wide. The covers would present only a slight contrast with the existing landscape. Pipelines and electrical lines between the wells and module buildings will be buried and disturbed areas restored and re-seeded. Module buildings and booster pump stations will be small metal buildings approximately 8 to 10 feet tall (wall height), 10 to 20 feet wide, and 25 to 45 feet long. Ross TR Figure 3.1-9 depicts the module building preliminary design. A schematic of a typical booster pump station is provided as Figure 3.1-2 in the KEA TR. Oxygen and carbon dioxide storage tanks may also be located near each module building. There will be approximately 54 module buildings within the proposed KEA. Electrical distribution lines (typically overhead) will connect module buildings to existing transportation lines. The distribution poles will be approximately 20 to 40 feet high and wooden so that the natural color harmonizes with the landscape.

MIT will be required on all wells at least every 5 years pursuant to LC 10.5 of SUA-1601. Due to the number of injection, recovery, and monitor wells, Strata anticipates that two MIT units will operate on a regular basis. As the recovery or injection rate decreases in individual wells, a swabbing or work over rig may be used to stimulate the wells. A light duty truck would be used for testing and well stimulation.

Operations will occur in an area where oil production occurs today. Wellhead covers, module buildings, booster pump stations, access roads, buried utilities and power lines will be noticeable from certain public vantages;

however, they will not be the only prominent industrial features in the area. Solid geometric features such as storage tanks, pump jacks, maintenance buildings, power lines, and meter houses are prominent in the immediate foreground and often are noticeable in the foreground views by the casual observer.

Despite the existing visual impacts from oil development and the average scenic quality rating for the proposed KEA, Strata intends to implement measures to lessen the visual impact from the project. Mitigation measures for visual and scenic resources impacts during operation are discussed in Section 5.9 of this ER and include providing dust suppression on access roads and restoring and re-seeding previously disturbed areas, temporary access roads, and tertiary access roads that are no longer used.

4.9.1.3 Potential Aquifer Restoration Impacts

Potential visual and scenic resources impacts during aquifer restoration will be similar to or less than those during operations. These will include altered landscape from structures and facilities and the appearance of vehicles and dust traveling within the proposed KEA and on county roads near the proposed KEA. The potential impacts will be lower due to a reduced workforce, reduced frequency of wellfield operation and maintenance activities, and lack of wellfield development during aquifer restoration. In addition, as Strata receives regulatory approval for successful aquifer restoration within the wellfield modules, decommissioning of those modules will occur, such that the total area occupied by structures and facilities will begin to decrease during the aquifer restoration phase.

4.9.1.4 Potential Decommissioning Impacts

Decommissioning activities will be similar to those during construction and primarily will be attributed to heavy equipment operations. Wellfields and surface facilities within the proposed KEA would be decommissioned using the same methods described for the Ross ISR Project. Similarly, the proposed KEA would be revegetated in accordance with WDEQ/LQD requirements. Following decommissioning, the visual landscape within the proposed KEA would be returned to its pre-construction landscape.

4.9.2 No Action Alternative

Under the No Action Alternative, the Ross ISR Project license would not be amended and ISR wellfields and associated infrastructure would not be constructed within the proposed KEA. The visual and scenic resources within the proposed KEA would not change from existing conditions.

4.10 Potential Socioeconomic Impacts

4.10.1 Proposed Action

The Proposed Action would extend the duration but would not increase the magnitude of the potential socioeconomic impacts approved for the Ross ISR Project. Potential socioeconomic impacts will occur during all phases of the Proposed Action, including construction, operation, aquifer restoration, and decommissioning. This section describes how the potential impacts evaluated for the Ross ISR Project will be extended. Strata anticipates the workforce required for the Proposed Action will not increase that required for the Ross ISR Project.

The proposed KEA is located in western Crook County, Wyoming, and the area within a 50-mile radius of the site includes portions of Crook, Campbell and Weston counties in Wyoming, small portions of Powder River and Carter counties in Montana, and very small parts of Butte and Lawrence counties in South Dakota (see Figure 3.10-1 of this ER). The direct zone of influence in which the Proposed Action's potential socioeconomic impacts are most likely to occur include Crook County, which will benefit directly from mineral production tax and property tax revenues, and adjacent Campbell County, which has the nearest urban area (Gillette) and is therefore a potential source of labor, services and materials to support the ISR operation.

4.10.1.1 Potential Construction Impacts

Construction activities for the Proposed Action will be limited to additional wellfields and associated access roads, module buildings, booster pump stations, pipelines, and utilities. As described in Section 4.2.1.1 of this ER, construction activities will be completed by a "wellfield crew" of approximately 25 people, which will carry over from the Ross ISR Project.

There will be some economic benefits during ongoing construction of the proposed KEA wellfields in the form of payroll taxes, sales and use taxes, but these will be in the form of extending the duration of such taxes that are collected during operation of the Ross ISR Project. The applicant projects that wellfield construction activities will be extended by approximately 9.5 years by the Proposed Action (as depicted in Figure 1.4-1 of this ER).

The potential impact to each component of the socioeconomic system is discussed below.

Demographics

The construction phase of the Proposed Action is expected to last approximately 9.5 years, overlapping with the operation phase at the Ross ISR Project and the operation phase in the proposed KEA. Construction activities will be completed by a "wellfield crew" of approximately 25 people, carrying over from the Ross ISR Project. Strata anticipates that most of the workers will reside in larger population centers such as Gillette, but would also commute from towns such as Moorcroft, Pine Haven, and possibly Sundance.

Income

In 2013 the median per capita income was $50,969 in Campbell County and $47,493 in Crook County, compared with a State average of $52,826 and a national average of $44,765 (WDAI/EA 2015). It is expected that workers would be paid the regional rates typical of Campbell County, where a higher percentage of jobs are in the relatively higher-paying energy industry. Potential impacts of construction under the Proposed Action on local income would be small since workers would already be employed by Strata at the Ross ISR Project.

Housing

Changes in population and income levels drive changes in housing demand. Since the construction workforce will carry over from the Ross ISR Project, there should not be a change to the current housing vacancy rates.

Employment Structure

Employment structure represents the resource-based extractive industries of the area. The continued development of an ISR project would add slightly to the economic diversity of the resource-dependent area by developing a non-carbon fuel source in an area dominated by extraction of coal, CBNG, and conventional oil and gas. The construction phase of the Proposed Action would have a small impact on employment structure.

Local Finance

Local finance represents revenue associated with economic activity in the area (minus the cost associated with providing services for a changing population). Since the construction workforce would come from the Ross ISR Project, there will be a short-term, small beneficial impact on the local economy. The Proposed Action will extend in duration the taxes derived from the value of construction equipment, and use tax on purchases for the Proposed Action would contribute to the Crook County tax base. Tax revenue would accrue to Crook County based on the value of construction equipment on the site. This income would help offset any increased needs for public services, such as ambulance service and fire control.

Distribution of tax revenue could be a problem in some areas. Specifically, because of the structure of the taxing system, taxes might not accrue or be distributed to the localities proportionately to the population/public service impacts experienced by those entities. This would be the case, for example, for workers that choose to live in Campbell County. Tax revenue might accrue mainly in Crook County and to the State. Similarly, small towns experiencing increased population/public service demand might not receive a proportionate level of tax increase as sales tax accrues in the larger population centers. However, the construction workers will carry over from the Ross ISR Project and likely will reside within these two counties. In general, the construction phase of the Proposed Action would have a small impact on local finances.

Education

There is no local housing at the proposed KEA. Since the construction workers will carry over from the Ross ISR Project, it is assumed that most of the construction workers would continue to live in Campbell and Crook counties, primarily in the communities of Gillette, Moorcroft, and possibly Sundance. Therefore, the construction workforce and their families will have a small impact on the local infrastructure, schools, and public services.

Health and Social Services

Increases in population and changes in population characteristics cause changes in the demand for health and human services. However, in this case

the construction workers will carry over from the Ross ISR Project. Therefore, the impact on health and social services during the construction phase of the Proposed Action would be small.

4.10.1.2 Potential Operation Impacts

As described in Section 1.4 of this ER, the proposed KEA is projected to extend the duration of the operation phase of the Ross ISR Project by 9 to 11 years. The operations workforce would impact the local economy by maintaining about 60 relatively high-paying jobs, with their associated payroll, sales, use and personal property taxes, for an additional 9 to 11 years. On an annual basis, the magnitude of these impacts would not change, but their duration would be extended by the Proposed Action. Because the operations would not change employment levels, they would not impact housing, educational facilities or requirements for health and social services.

Tax revenues would continue to accrue to Crook County and the State of Wyoming during operations as described in Ross ER Section 4.10.1.2. The majority of these taxes are based on the pounds of minerals produced and sold, including severance taxes, State royalties, and production taxes. Property taxes will be assessed on the facilities constructed to support the operations. Only minimal facilities will be required for the Proposed Action, including new wellfields and associated infrastructure. Since Ross ISR Project wellfields will be decommissioned as new wellfields are brought on line, no additional property taxes were considered for the Proposed Action. Estimated major tax revenues from the Proposed Action and the bases for the estimates are shown in Table 4.10-1. The impact of collecting the taxes shown in Table 4.10-1 for an additional 11 years would be considered small on a state-wide basis and moderate for Crook County (see Table 3.10-10 of this ER for comparison).

4.10.1.3 Potential Aquifer Restoration Impacts

The workforce is expected to be reduced by one-half to two-thirds during aquifer restoration, so the socioeconomic impacts will be similarly small. Toward the end of the operations phase, revenues from production and severance taxes and any State royalties will decline and eventually cease. Thus the positive benefits from these revenues will cease to exist.

4.10.1.4 Potential Decommissioning Impacts

During decommissioning, a similar workforce as that required for construction will be required. As described in the ISR GEIS (pg. 4.4-33), up to 200 workers with similar skills to those required for construction are needed at a typical ISR facility. Strata anticipates that the workforce required to decommission the wellfields and associated infrastructure within the proposed KEA will be similar to that required to decommission the Ross ISR Project wellfields and smaller than the workforce required to decommission the Ross CPP and associated infrastructure. Decommissioning, whether done by a contractor or using operations staff after operations cease, will have similar socioeconomic impacts to those during construction.

4.10.2 No Action Alternative

Under the No Action Alternative, the Ross ISR Project license would not be amended and potential socioeconomic impacts would not occur due to the Proposed Action.

Table 4.10-1. Estimated Major Tax Revenues from the Proposed Action

Revenue Source	Estimated Tax Revenues	
	Average per Year	Over 11 Years
Severance taxes [1]	$1,038,390	$11,422,260
State royalties [2]	$ 141,480	$ 1,556,280
Gross production taxes [3]	$1,596,520	$17,561,720
Total	$2,776,390	$30,540,260

[1] Estimated as 8.8 million lb U_3O_8 x $45/lb x industry factor (0.721102) x tax rate (4%)
[2] Estimated as 8.8 million lb U_3O_8 x 13.1% from State lands * $45/lb * royalty rate (3%)
[3] Estimated as 8.8 million lb U_3O_8 x $45/lb x industry factor (0.721102) x tax rate (0.0615)
Sources: Wyoming Department of Revenue (2014), Crook County Assessor (2015), OSLI (2000)

4.11 Potential Environmental Justice Impacts

Because no minority or low-income populations as defined by EO 12898 were identified in the analysis area, no further analysis of environmental justice was conducted.

4.12 Potential Public and Occupational Health Impacts

4.12.1 Proposed Action

NUREG-1748 and NUREG-1569 recommend that the application should describe potential public and occupational health impacts from both non-radiological and radiological sources. Strata will protect public and occupational health by complying with the Radiation Protection Standards contained in 10 CFR Part 20 and following the ALARA principle. The radiation safety controls and monitoring programs for the Ross ISR Project are described in Ross TR Section 5.7. These same radiation safety controls and monitoring programs will be implemented at the proposed KEA.

The Proposed Action would extend the duration and expand the area of the potential public and occupational health impacts approved for the Ross ISR Project. Tables ER RAI P&O Health-1-3 through ER RAI P&O Health-1-6 in the Ross ISR Project ER RAI responses (Strata 2012) presented the anticipated principal locations of all workers during the various project phases of the Ross ISR Project. Strata anticipates that the proportion of the workforce located in the wellfield versus the Ross CPP and other areas will not change for the Proposed Action.

4.12.1.1 Potential Construction Impacts

During the construction phase of the Proposed Action, potential impacts to public and occupational health include: fugitive dust, combustion emissions, noise, and occupational hazards associated with construction of the wellfield, module buildings, booster pump stations, pipelines and utilities. Potential impacts from fugitive dust and combustion emissions are described in Section 4.6 of this ER. As described in the ISR GEIS (pg. 4.2-53), fugitive dust would not likely result in any significant radiological dose as long as soils show low levels of radionuclides. Baseline radiological soil sampling and gamma surveys within the proposed KEA are discussed in Section 3.11 of this ER. The soil results indicated low levels (0.4 – 2.3 pCi/g) of radium in the surface soil, while gamma radiation exposure rates ranged from 9 to 15 µR/hr. Based on the low levels of radionuclides in soil it is not likely fugitive dust would contribute a significant radiological dose.

Section 4.7 of this ER addresses potential noise levels associated with construction equipment. Members of the public will not be exposed to potentially damaging noise levels, and a hearing conservation program for Strata employees and contractors will minimize potential occupational noise impacts during construction. Other potential occupational hazards will be those typical of heavy construction and drilling. These include occupational injuries such as strains and sprains resulting from common incidents such as slips/trips/falls or lifting. Potential occupational injuries will be minimized by implementing worker safety procedures that conform to the Wyoming Occupational Health and Safety Act, Title 27, Labor and Employment, Chapter 11, Occupational Health and Safety and applicable OSHA standards.

4.12.1.2 Potential Operation Impacts

Similar to the Ross ISR Project, the Proposed Action will have the potential for radiological and non-radiological impacts to public and occupational health. The potential for radiological and non-radiological impacts include those typical of normal operation and those associated with accidents. The following sections detail the potential impacts to workers and the public within the proposed KEA.

4.12.1.2.1 Potential Non-radiological Impacts from Normal Operations

Potential non-radiological public and occupational health impacts will be related to fugitive dust, combustion emissions, noise, and contamination of water supplies. The following sections describe these potential impacts based on the potential pathways of exposure. The receptors for non-radiological impacts include nearby residences, public schools and drinking water intakes.

4.12.1.2.1.1 Potential Exposures from Air Pathways

Non-radiological airborne effluents in the proposed KEA will consist of fugitive dust from access roads and wellfield activities and vehicle combustion emissions. Fugitive dust emissions will be controlled by implementing dust control BMPs such as speed limits and dust suppressants. Additionally, vehicle combustion emissions will be lower during operation than construction since fewer workers will be required. Potential air quality impacts are discussed in Section 4.6 of this ER. Potential noise impacts during operation are addressed in Section 4.7 of this ER.

4.12.1.2.1.2 Potential Exposures from Water Pathways

Public water supply information was obtained from the 2013 Water System Survey Report from the Wyoming Water Development Commission (WWDC 2014) and additional WWDC reports. The nearest public water supply wells are 10 to 12 miles from the proposed KEA (City of Gillette wells) as described below. The nearest public water supply occurs in Pine Haven, approximately 15 miles south-southeast of the proposed KEA. Pine Haven is served by two public water supply wells, the deeper of which is approximately 3,200 feet deep. Additional details from the WWDC (2009a) indicate that both wells are completed in the Madison Formation and that the total pumping rate is about 60,000 gpd.

The Hulett public water supply is approximately 19 miles east-northeast of the proposed KEA. Hulett is served by one public water supply well that is approximately 1,900 feet deep and completed in the Madison Formation. The total annual water usage is approximately 30 million gallons, which equates to a typical water usage rate of about 82,000 gpd (WWDC 2014).

The Moorcroft public water supply is approximately 16 miles south of the proposed KEA. This system is currently supplied by seven wells. Six of the wells are completed in the Fox Hills Formation. The main water supply well, located approximately 7 miles east of Moorcroft, is completed in the Madison Formation at a depth of approximately 3,300 feet (City of Moorcroft 2015). The total annual water usage is approximately 41 million gallons (or approximately 112,000 gpd) and the peak day water use for the system is 236,400 gallons (WWDC 2014).

The City of Gillette, though farther from the proposed KEA than the aforementioned municipalities, is supplied by groundwater pumped from 26 wells, including a battery of 10 active water supply wells some 42 miles from Gillette and 10 to 12 miles southeast of the proposed KEA. The wells are located adjacent to U.S. Highway 14 about 5 miles north of the town of Pine Haven. According to a 2009 WWDC report (WWDC 2009b), the wells are completed in the Madison Formation to depths of 2,350 to 2,500 feet. The total capacity of the Madison wells is about 8,700 gpm. The Madison wells provide about 80% of the water used by the City of Gillette, with the remaining 20% coming from in-town wells completed in the Fort Union Formation. Although

in-town Lance-Fox Hills Formation wells are also available to the City, their poor water quality limits their use.

The potential to impact area public water supplies as result of the Proposed Action is extremely remote. The public water supplies within 20 miles (32 km) that are completed in the Madison Formation are stratigraphically far below the Lance-Fox Hills Formation targeted for uranium ISR in the proposed KEA. As described in the approved deep disposal well application (Ross TR Addendum 4.2-A), the depth to the top of the Madison Formation within the Ross ISR Project is anticipated to be approximately 7,000 feet. By comparison, the depth to the ore zone is about 200 to 900 feet within the proposed KEA. Between these intervals is the Pierre Shale, which is considered a regional confining unit. Furthermore, the minimum distance from the proposed KEA to a public water supply well is at least 10 miles.

Rural residents of the area surrounding the proposed KEA have private wells that provide drinking water for household use and livestock watering. A description of the domestic water supply wells near the proposed KEA is included with the description of the baseline groundwater quality monitoring program in Section 3.4.3.4 of this ER. Water quality impacts from normal operation of the wellfield within the proposed KEA will be confined to the portions of the ore zone within the aquifer exemption boundary, and therefore there will be no public health impacts to nearby drinking water wells from normal operations.

4.12.1.2.1.3 Potential Exposures from Flora and Fauna

No non-radiological impacts to the public or workers have been identified from flora and fauna pathways.

4.12.1.2.2 Potential Non-radiological Impacts from Accidents

4.12.1.2.2.1 Work-Related Accidents

According to the U.S. Department of Labor (2014), there were 17 fatalities in the Wyoming mining industry between 2010 and 2013. This number includes fatal injuries at all establishments categorized as Mining (Sector 21) in the North American Industry Classification System (NAICS), including establishments not governed by the Mine Safety and Health Administration (MSHA) rules and reporting, such as those in Oil and Gas

Extraction. Information on workers compensation claims for the Wyoming mining industry (NAICS code 212) is available from the Wyoming WorkForce Services, Division of Workers' Compensation (2014). Table 4.12-1 summarizes available data on workers compensation claims for the Wyoming mining industry from 2010 through 2013, including the uranium industry. Based on the average number of full-time workers, the average workers compensation claim rate for the uranium industry was 4.2 workers compensation claims per 100 full-time workers. As stated in Section 4.10.1.2 of this ER, the size of the operational workforce is not anticipated to increase under the Proposed Action (the operational workforce for the Ross ISR Project is expected to be up to 60 full-time workers). Since the rates shown in Table 4.12-1 are based on numbers of workers compensation claims per 100 full-time workers, the expected rates for the Proposed Action would be expected to be less than those shown in the table.

Accidents that may occur in ISR operations are generally minor when compared to typical accidents in other industries. Radiological accidents that might occur would typically manifest themselves slowly and are therefore easily detected and mitigated. The remote location of the proposed KEA and the low level of radioactivity associated with the process combine to decrease the potential hazard of an accident to the general public.

NRC has previously evaluated the effects of accidents at conventional uranium milling facilities in NUREG-0706 and specifically at uranium ISR facilities in NUREG/CR-6733. These analyses demonstrate, for most credible potential accidents, consequences are minor so long as effective emergency procedures and properly trained personnel are used. Strata will develop emergency management procedures to implement the recommendations contained in the NRC analyses. Training programs, discussed in Chapter 5 of the Ross TR, will ensure that Strata personnel are adequately trained to respond to all potential emergencies.

NUREG-0706 considered the environmental effects of accidents at single and multiple uranium milling facilities. Analyses were performed on incidents involving radioactivity and these incidents were classified as trivial, small, and large. Some of the analyses in NUREG-0706 are applicable to ISR facilities, such as transportation accidents. NUREG/CR-6733 specifically addressed

risks at ISR facilities and identified the "risk insights" that are discussed in the following sections.

4.12.1.2.2.2 Chemical Accidents

NUREG/CR-6733 noted that the scope of the NRC mission includes hazardous chemicals to the extent that mishaps with these chemicals could affect releases of radioactive materials. Industrial safety aspects associated with the use of chemicals will be regulated by EPA and WDEQ in addition to the State Mine Inspector.

Process-related chemicals stored on site at the proposed KEA will include oxygen and carbon dioxide. These chemicals will be stored in the wellfield near the module buildings. Chemicals will be stored to minimize the potential hazard to the public or to workers' health and safety. Strata will have strict SOPs regarding receiving, storing, handling, and disposing of chemicals to ensure the safety of the public and workers.

Oxygen

Oxygen at the proposed KEA will be added to the injection stream upstream of the injection manifolds within the module buildings or at each well head. Oxygen will be stored as a cryogenic liquid near the wellfield module buildings. Oxygen will be delivered and stored in liquid form and then conveyed to the injection point in gas form. The design and installation of the oxygen storage facility is typically performed by the oxygen supplier and meets applicable industry standards, including NFPA 55 and OSHA standards at 29 CFR 1910.104. The design and installation of underground and above-ground gaseous oxygen piping at the proposed KEA, including material specifications, velocity restrictions, location and specifications for valves, and design specifications for metering stations and filters, will be in accordance with industry standards contained in Compressed Gas Association (CGA) G4.4.

The hazards associated with oxygen storage include combustion and explosion. To reduce the risk of an accident that could potentially affect other processes or storage facilities and radiological safety, oxygen will be stored an appropriate distance from other infrastructure and storage areas. Facilities used to store oxygen at the project will conform to NFPA 55 standards.

Conveyance systems for oxygen will be clean of oil and grease because these substances will burn violently if ignited in the presence of oxygen. The

proper pressure relief devices, component isolation and barriers will also be employed. Cleaning of equipment used for delivery and storage of oxygen will be done in accordance with CGA G4.1. The design and installation of the oxygen piping system will be done according to the requirements of CGA G4.4. Strata will develop procedures that implement emergency response instructions for a spill or fire involving oxygen systems.

Carbon Dioxide

Carbon dioxide may be used in the ISR process as a source of carbonate to fortify the barren lixiviant within the module buildings. Carbon dioxide presents few potential hazards in its use. The main hazard is through asphyxiation if it is allowed to accumulate in a confined area. To reduce the risk of a harmful accident, carbon dioxide will be stored outside of the module buildings.

4.12.1.2.3 Potential Radiological Impacts from Normal Operations

Strata completed an assessment of the radiological effects of the Ross ISR Project based on the types of emissions, potential pathways, and potential consequences of radiological emissions. As described in Ross ER Section 4.12.1.2.3, the assessment found that the predominant radiological emission during operation will be radon-222 and its progeny. The potential planned and unplanned exposure pathways identified by Strata include air, water and flora and fauna. The following discusses potential radiological impacts for each pathway for the Proposed Action.

4.12.1.2.3.1 Potential Exposures from Water Pathways

Strata will control and monitor the solutions in the ore zone to ensure that migration does not occur. This will include maintaining a net inward hydraulic gradient in accordance with LC 10.7 of SUA-1601 beginning during initial production and continuing until initiation of stability monitoring. Additionally, excursion monitoring will be conducted in accordance with LC 11.5 of SUA-1601 to ensure that there is no migration to surface waters or adjacent non-exempt USDWs.

4.12.1.2.3.2 Potential Exposures from Air Pathways

The primary sources of radon-222 gas within the proposed KEA will be from occasional wellfield venting for sampling events, small unavoidable leaks in the wellfield, and maintenance of wellfield equipment.

An analysis of the potential impacts of airborne radiological effluents at the Ross ISR Project was provided in Ross TR Section 7.3. The MILDOS model was accepted for this purpose in the NRC staff's SER for the Ross ISR Project (NRC 2014). This analysis was completed using the MILDOS-AREA model (MILDOS, ANL 2012) to define the maximally exposed member of the public at the site. Similar methodology has been applied to the KEA to calculate radon source terms and estimate public doses within and near the proposed KEA.

The design of the MILDOS analysis for the proposed KEA considered the relatively larger acreage of the proposed KEA with respect to the original Ross license area as well as the anticipated operations schedule for the proposed KEA and Ross ISR Project mine units. Site specific data for the MILDOS calculations are provided in Table 4.12-2. Multiple receptors were considered at all occupiable structures near the property, as well as at some locations relative to other "casual" members of the public potentially engaged in various activities. The technical documentation and justification for the use of the MILDOS code and its design parameters are provided in Ross TR Section 7.3.4.1.

Table 4.12-3 contains the total equivalent dose estimate (TEDE) results for all resident receptor locations, listed by year, with source term contributions as described in Section 7.3 of the KEA TR. The maximum TEDE to each resident receptor from Table 4.12-3 is depicted on Figure 4.12-1. Note that all calculations in each year include a source term for the Ross CPP of 255.2 Ci/yr. The Wesley resident represented the maximally exposed member of the public in this study; however, the previously developed isodose curves in the Ross TR (Figure 7.3-4) demonstrate that there could be a member of the public within the mine unit areas that could have a comparable dose (although still quite small), if they were regularly located in these areas for unforeseen circumstances for a significant portion of the year. All doses to public receptors within the Ross ISR Project and proposed KEA are projected to be ≤ 2% of the annual public dose limit as defined in 10 CFR § 20.1301, demonstrating that the facility can operate in a manner consistent with ALARA principles. The dose

to all public receptors near the Ross ISR Project and proposed KEA will also comply with EPA requirements found in 40 CFR Part 190 of 25 mrem/yr dose excluding radon, as all doses to receptors due to operations at the Ross ISR Project and proposed KEA are the exclusive result of radon and its progeny and all are < 2 mrem/ yr.

The contribution to dose as a result of ISR activities in the proposed KEA provides only a small fraction of the annual public dose limits above background. The proposed KEA mine units can be operated in a manner that is protective of public health and safety from the perspective of radiological exposure.

4.12.1.2.3.3 Potential Exposure from Flora and Fauna

Because of their relative mobility, some native animals, including small mammals and birds, may have contact with radon-222 releases and associated progeny. It is possible that individual animals might have contact with higher concentrations of radionuclides than any member of the public because of potential proximity to releases. However, the mobility of biota makes it unlikely that any individual animal will receive a constant concentration for the entire year.

U.S. Department of Energy Order 458.1 indicates that "radiological activities that have the potential to impact the environment must be conducted in a manner that protects populations of aquatic animals, terrestrial plants, and terrestrial animals in local ecosystems from adverse effects due to radiation and radioactive material" (DOE 2013). When actions are not adequate to protect biota an evaluation must be done using a graded approach. Table 2.2 of DOE-STD-1153-2002 lists the dose limit for aquatic organisms and terrestrial plants as one rad per day (1 rad/d) and 0.1 rad/d for terrestrial animals (DOE 2002). The dose limits are expected to be far higher than the doses that would be calculated to any non-human receptor; therefore, it is reasonable to expect no significant impact from exposure of biota from releases from the Proposed Action.

4.12.1.2.4 Potential Radiological Impacts from Accidents

This section discusses potential accident scenarios that could have radiological impacts. Mitigation measures to reduce or eliminate these impacts

are discussed in Section 5.12.2 of this ER. Ross TR Section 5.7 describes the radiation safety controls and monitoring programs that will be implemented at the Ross ISR Project. These programs were developed to assure that operations criteria established in NUREG/CR-6733 will be followed such that the occupational health impacts and accident risks described in that document will be applicable to the Ross ISR Project. These same radiation safety controls and monitoring programs will be implemented within the proposed KEA as applicable.

Wellfield Spill/Pipeline Failure

The rupture of an injection or recovery feeder line or individual flow line in a wellfield module, or a trunk line between a wellfield module and the Ross CPP, would result in a release of injection or recovery solution which could contaminate the ground in the area of the break. Occasionally, small leaks at pipe joints and fittings may occur. Small leaks in wellfield piping typically occur in the injection system due to the higher system pressures. Until remedied, these leaks may drip injection or recovery solutions onto the underlying soil. Strata will monitor trunk lines, feeder lines, and individual flow lines for changes in pressure or flow. Significant variation in these parameters will signal alarms at the Ross CPP, which will prompt an investigation of the potential leak. These leaks seldom result in soil contamination. Following repair of a leak, Strata will require that the affected soil be surveyed for contamination and the area of the spill documented. If contamination is detected, the soil is sampled and analyzed for the appropriate radionuclides. Any contamination would be removed as appropriate. Spills meeting the criteria in 10 CFR Part 20, Subpart M and 10 CFR 40.60 will be reported to the NRC in accordance with LC 11.6 of SUA-1601.

Booster Pump Station Failure

A piping failure in a booster pump station would have the same consequences and, for the most part, require the same preventative and mitigation measures as discussed in Ross TR Section 7.5.1.3. Strata has committed to providing the same secondary containment, instrumentation, control methods, alarms, construction methods, and periodic operational inspections for the booster pump stations at the proposed KEA as was

approved for module buildings at the Ross ISR Project. A summary of these commitments is as follows.

The operating parameters of injection and/or recovery lines in the booster pump stations will be continuously monitored from the Ross CPP. In the event that a significant piping failure causes a leak of injection or recovery fluids, the corresponding variation in flow or pressure will signal alarms in the booster pump station and at the Ross CPP. Automatic controls will stop operating equipment, and the operators will manually control equipment and valves to isolate and contain the leaking section of pipe. In addition, check valves will be placed on the downstream piping in the booster pump station to prevent backflow of the trunk line into the module building in the event of a large leak within the booster pump station. All piping will be rated for a maximum operating pressure greater than the proposed maximum for injection or recovery and piping will also be pressure tested for leakage prior to operation.

Leak detection sensors in each booster pump station floor sump will trigger audible and visual alarms in the booster pump station and in the Ross CPP. Operators will be immediately dispatched to the station for inspection, shutdown, and repair.

Weekly inspections of these facilities will be done by Strata personnel as outlined in Section 5.3 of the KEA TR. Following the repair of a leak the affected soil will be surveyed for contamination and the area of the spill will be documented. If contamination is detected, the soil is sampled and analyzed for the appropriate radionuclides. Contamination will be removed in accordance with NRC and/or State requirements.

Response procedures for spills and leaks at the proposed KEA will be conducted according to an emergency response plan and SOPs which will be prepared prior to the pre-operational inspection as required by LC 12.11 of SUA-1601. In addition, Strata will train local emergency responders to potential hazards at the proposed KEA in accordance with pre-operational LC 12.2 of SUA-1601.

4.12.1.3 Potential Aquifer Restoration Impacts

Aquifer restoration activities would have similar but generally smaller potential impacts to public and occupational health than during operation.

During aquifer restoration, potential impacts would be limited to fugitive dust and combustion emissions associated with wellfield traffic, noise and accidents (i.e., leaks and spills in the wellfields or trunk lines). Since the number of employees, chemical shipments and dried yellowcake shipments would be lower, potential radiological and non-radiological public and occupational health impacts would also be smaller.

4.12.1.4 Potential Decommissioning Impacts

During decommissioning potential radiological and non-radiological impacts to public and occupational health will be similar to those occurring during construction and include fugitive dust, noise, and occupational hazards. Decommissioning activities within the proposed KEA would be limited to the wellfields, module buildings, booster pump stations, and access roads. As required by LC 10.3 of SUA-1601, Strata will submit a decommissioning plan to NRC for review and approval at least 12 months prior to initiation of decommissioning. The plan will include details on the implementation of a 10 CFR Part 20 compliant radiation safety program. The safety program will ensure that the safety of the workers and public is maintained during decommissioning. Following successful decommissioning the proposed KEA will be released for unrestricted use.

4.12.2 No Action Alternative

Under the No Action Alternative, the Ross ISR Project license would not be amended and ISR wellfields and associated infrastructure would not be constructed within the proposed KEA. There would not be any potential public and occupational health impacts as a result of construction, operation, aquifer restoration and decommissioning activities within the proposed KEA.

Table 4.12-1. Wyoming Workers Compensation Claims

Year	NAICS Group	Claim Count	Employer Count	Employee Count
2010	Oil & Gas Extraction	127	157	3,658
	Coal Mining	235	16	7,249
	Metal Ore Mining	0	1	1
	Uranium Mine Workers	8	7	253
2011	Oil & Gas Extraction	102	167	3,854
	Coal Mining	232	18	7,501
	Metal Ore Mining	0	1	1
	Uranium Mine Workers	16	6	287
2012	Oil & Gas Extraction	122	161	4,160
	Coal Mining	202	18	7,850
	Metal Ore Mining	0	1	1
	Uranium Mine Workers	12	5	313
2013	Oil & Gas Extraction	91	153	4,048
	Coal Mining	187	16	7,076
	Metal Ore Mining	0	1	1
	Uranium Mine Workers	13	4	301

Source: Wyoming WorkForce Services, Division of Workers' Compensation (2014)

Table 4.12-2. Site-Specific Data for MILDOS Calculations

Parameter	**Value**	**Unit**
Ore Ra-226 concentration	200.2	pCi/g
Average lixiviant flow	7310	gpm
Average restoration flow	950	gpm
Operating days a year	365	Days
Ore formation porosity	34	%
Ore formation rock density	2.1	g/cm^3
Average residence time for lixiviant	11	Days
Average residence time for restoration solutions	32	Days
Average mass of ore material in mud pits	225,000	g
Number of mud pits generated per mine unit construction	670	Number of pits
Storage time in mud pits	20	Days
Rn-222 emanating power	0.25	-
Resin porosity	0.4	-
Stack height[1]	16	m
Stack diameter[1]	0.317	m
Stack exit velocity[1]	3.0	m/s

[1] These parameters were used in dispersion calculations, not source term calculations.

Table 4.12-3. Total Effective Dose Equivalent (TEDE) to an Adult Residential Receptor at all Locations in All Operating Phases (mrem/yr)

Resident Receptor	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
Wood	1.26	1.29	0.68	0.69	0.60	0.60	0.58	0.57
Strong	1.03	1.04	0.88	0.89	0.87	0.87	0.87	0.86
Oshoto	0.82	0.83	0.68	0.67	0.64	0.64	0.64	0.63
Wesley	1.45	1.48	1.22	1.18	1.13	1.13	1.12	1.11
SB Burch	0.09	0.10	0.11	0.12	0.12	0.10	0.10	0.11
DA Burch	0.09	0.10	0.12	0.13	0.13	0.11	0.10	0.12
A	0.22	0.23	0.19	0.18	0.17	0.17	0.17	0.17
B	0.46	0.48	0.40	0.37	0.35	0.35	0.34	0.34
C	0.21	0.22	0.18	0.17	0.16	0.16	0.16	0.16
D	0.25	0.25	0.21	0.21	0.20	0.20	0.20	0.20
E	0.09	0.10	0.08	0.08	0.09	0.09	0.11	0.12
F	0.07	0.08	0.06	0.07	0.07	0.07	0.08	0.10
G	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06
H	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05
I	0.11	0.13	0.14	0.16	0.15	0.13	0.12	0.14
J	0.08	0.09	0.12	0.13	0.13	0.11	0.10	0.12

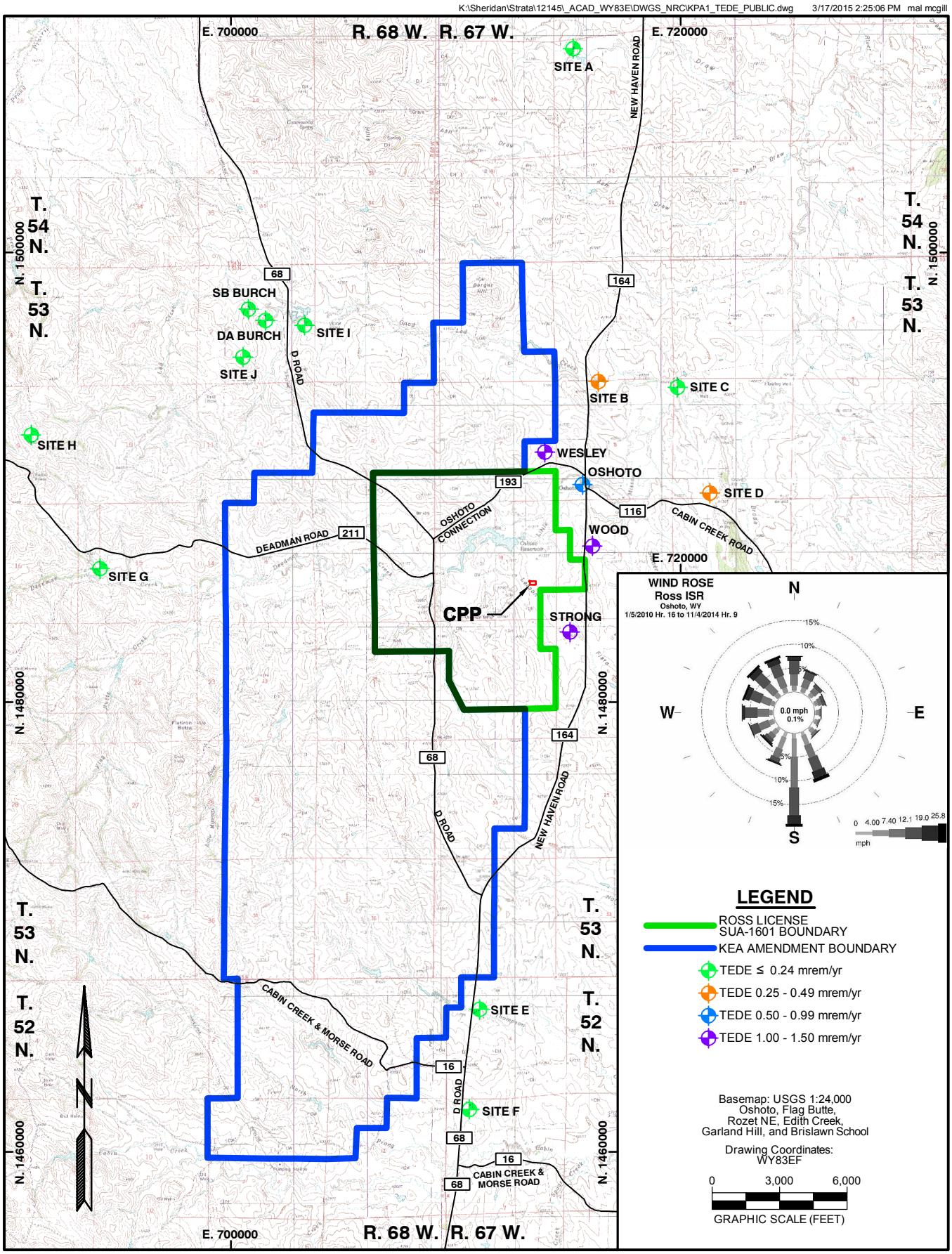


Figure 4.12-1. Maximum TEDE to Adult Residential Receptors.

4.13 Potential Waste Management Impacts

4.13.1 Proposed Action

The Proposed Action would extend the duration but not increase the magnitude of the potential waste management impacts approved for the Ross ISR Project. As described in Ross ER Section 4.13, uranium ISR facilities produce airborne effluents, liquid wastes, and solid waste during all project phases, which must be handled and disposed of properly. Waste streams for the Ross ISR Project are described in Ross ER Section 4.13.1 as well as in the responses to ER RAI Waste-1 and ER RAI Waste-2 (Strata 2012).

The anticipated waste quantities and waste management systems for the approved Ross ISR Project are provided in Table 4.13-1 and are not anticipated to change under the Proposed Action. Similarly, the anticipated waste disposal facilities for the approved Ross ISR Project, provided in Table 4.13-2, indicate that sufficient capacity is available for waste generated under the Proposed Action. Since the Proposed Action will not increase the quantities of the waste streams previously described for the Ross ISR Project, the following describes each of the waste streams identified for the Ross ISR Project and details any changes associated with the Proposed Action.

4.13.1.1 Waste Management Systems

This section describes the types and quantities of waste anticipated during construction, operation, aquifer restoration, and decommissioning under the Proposed Action. Liquid and solid wastes are divided into two general categories: AEA-regulated waste and non-AEA-regulated waste. AEA-regulated waste includes liquids and solids meeting the definition of 11e.(2) byproduct material as defined by 10 CFR § 40.4: "The tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content." The major sources of AEA-regulated liquid waste generated from the Proposed Action will include wastewater from operation and aquifer restoration activities in the wellfields and from equipment and personnel decontamination. Non-AEA-regulated liquid waste will include TENORM (technologically enhanced naturally occurring radioactive materials) and storm water runoff. AEA-regulated solid waste will include scale and sludge from equipment maintenance, contaminated soil, contaminated

solids from ISR wells, contaminated personal protective equipment (PPE), and contaminated materials and equipment from decommissioning that cannot be decontaminated to approved levels. Non-AEA-regulated solid waste will include construction debris, solid hazardous waste, and decontaminated material and equipment.

4.13.1.1.1 AEA–Regulated Waste

4.13.1.1.1.1 Brine

Brine will be generated at the Ross CPP from RO treatment of the production bleed and from RO treatment of the aquifer restoration water. Most of the brine will be generated during concurrent operation and aquifer restoration, when the levels of brine resulting from RO treatment of the production bleed and RO treatment of restoration fluids will be highest. Ross TR Table 4.2-6 presents the anticipated quantity of brine during each phase of the Ross ISR Project. These typical quantities are not anticipated to change under the Proposed Action, since the quantity of brine generated by the Ross ISR Project is a function of the Ross CPP facility throughput, which Strata is not proposing to increase under the Proposed Action.

Brine will be routed from the production and restoration RO units in the Ross CPP to a wastewater collection system and lined retention ponds as described in Ross TR Section 4.2. Most of the brine generated will be disposed in Class I deep disposal wells with the Ross ISR Project area. Brine will be pumped to the deep disposal wells in buried pipelines, and storage tanks will provide surge capacity for each disposal well. The secondary method of brine disposal is evaporation in lined retention ponds, also located within the Ross ISR Project area. The quantity of brine generated during operation will be minimized primarily by employing two stages of RO. Strata will further reduce the brine quantity by employing limited groundwater sweep during aquifer restoration.

Potential impacts from brine management are addressed in Ross ER Section 4.13.1.1.1.1 and include potential leaking pipes in the wastewater collection system, potential leaks from the lined retention ponds, potential spills from transportation of wellfield wastewater (e.g., resulting from well work over) to the ponds, and potential deep disposal well impacts, including potential pipeline leaks and potential groundwater impacts. Under the

Proposed Action, brine will not be generated or transported through the proposed KEA; therefore, there will be no additional potential environmental impacts from brine disposal beyond those approved for the Ross ISR Project.

4.13.1.1.1.2 Excess Permeate

Excess permeate will only be present during two relatively brief operational periods: uranium production without concurrent aquifer restoration and groundwater sweep in the first wellfield module(s) undergoing aquifer restoration. It is anticipated that any excess permeate generated from wellfields in the proposed KEA would be injected into wellfields undergoing aquifer restoration, since uranium production in the first wellfields within the proposed KEA is anticipated to occur at the same time as aquifer restoration in Ross ISR Project wellfields. In the event that excess permeate is generated under the Proposed Action, it would be recycled to the Ross CPP for plant make-up water or disposed, along with brine, in the Class I deep disposal wells.

4.13.1.1.1.3 Other 11e.(2) Liquid Waste

Other 11e.(2) liquid waste includes spent eluate, liquid from process drains in the Ross CPP, fluids generated from work over operations on injection and recovery wells, contaminated reagents, resin transfer wash water, filter backwash water, plant wash down water, and decontamination water (e.g., employee showers). Of these, only fluids generated from work over operations on injection and recovery wells will be present temporarily in the proposed KEA. Liquid wastes generated in the Ross CPP will be discharged into the lined retention ponds, while water collected from swabbing or other work over activities on injection and recovery wells, including from proposed KEA wellfields, will be collected in dedicated tanks and transported to the lined retention ponds near the Ross CPP. Any water captured from leaking pipelines or equipment will also be transported to lined retention ponds in dedicated portable tanks or tanker trucks.

Other 11e.(2) liquid wastes will be managed with brine and disposed primarily through deep well injection, with lesser amounts evaporated in the lined retention ponds prior to disposal. The anticipated quantity of other 11e.(2) liquid waste is shown in Ross TR Table 4.2-6.

4.13.1.1.1.4 Solid 11e.(2) Byproduct Material

Solid 11e.(2) byproduct material associated with the Ross ISR Project includes filtrate and spent filter media from production and restoration circuits; general sludge, scale, etc. from maintenance operations; affected soil collected from any spill or leak areas; spent/damaged ion exchange resin; well solids from injection/recovery well work over operations; contaminated PPE; wellfield decommissioning waste such as pipelines, pumps, and impacted soil; affected concrete floors, sumps and berms in the Ross CPP; equipment and piping in the Ross CPP; pond sludge, pond liners, and leak detection systems; and deep disposal well piping and equipment. Within the proposed KEA, solid 11e.(2) byproduct material will be limited to that resulting from wellfield maintenance activities, well work over operations, impacted soil, and decommissioning waste. This material will be classified as 11e.(2) byproduct material under 10 CFR Part 40 and will be handled and shipped as low-specific-activity material. Strata anticipates that the total quantity of solid 11e.(2) byproduct material generated on a wellfield module basis under the Proposed Action will not differ from the Ross ISR Project.

Solid 11e.(2) byproduct material will be accumulated within the 11e.(2) Storage and Preparation Area near the Ross CPP. One or more additional 11e.(2) byproduct material storage areas may be designated outside of the Ross CPP (including, potentially, within the proposed KEA) to accommodate large items such as contaminated equipment that cannot be stored inside. Such areas would be fenced, locked and posted with signs indicating they are restricted-access 11e.(2) byproduct material storage areas. Material stored in these areas would be covered/sealed in a manner that prevents the spread of contamination. Shipping procedures involve transporting the 11e.(2) byproduct material as low-specific-activity material in sealed roll-off containers in accordance with applicable DOT material shipping provisions. 11e.(2) byproduct material will be disposed in a uranium mill tailings impoundment at a disposal facility licensed by NRC or an agreement state as required by LC 9.9 of SUA-1601. Table 4.13-2 describes potential waste disposal facilities.

4.13.1.1.2 Non-AEA-Regulated Waste

4.13.1.1.2.1 Solid Waste

Solid waste has been divided into four categories: industrial or municipal solid waste, recyclable solid waste, construction/demolition waste, and petroleum-contaminated soil. The waste management processes associated with these solid waste streams are described below.

Industrial or Municipal Solid Waste

Industrial or municipal solid waste will be accumulated in roll-off containers in designated areas during construction and decommissioning. The designated areas will occur in wellfield staging/storage areas and within the Ross CPP area. During operation and aquifer restoration, industrial or municipal solid waste will be accumulated in trash cans in the work areas and transferred to larger receptacles (dumpsters) at the designated solid waste storage area near the Ross CPP and adjacent to an access road for ease of access by a waste disposal contractor. Industrial or municipal solid waste will be shipped to a municipal landfill permitted by WDEQ/SHWD or another state, where it will be buried in an engineered containment system. As described in Section 3.12 of this ER, the nearest solid waste disposal facilities to the proposed KEA include those in or near Moorcroft and Gillette, Wyoming and Belle Fourche, South Dakota.

Recyclable Solid Waste

Recyclable solid waste will be accumulated in recycling bins located in work areas. The contents of these bins will be transferred to larger receptacles at the designated solid waste storage area near the Ross CPP for access by a waste disposal contractor. Recyclable solid waste will be transported to a recycling facility or recyclable solid waste collection facility.

Construction/Demolition Waste

Construction/demolition waste will be accumulated in roll-off containers in designated areas during all project phases. These areas will include designated portions of wellfield staging/storage areas and a designated portion of the Ross CPP area. During decommissioning, when a relatively large volume of construction/demolition waste will be generated, the waste may be accumulated outside of roll-off containers in designated temporary storage

areas. Construction/demolition waste will be transported to a municipal landfill for disposal in a designated containment system or disposed on-site in a WDEQ/SHWD approved facility on Strata-owned surface within or adjacent to the original Ross license area.

Petroleum-Contaminated Soil

Petroleum-contaminated soil would result for equipment spills and leak. Strata anticipates that the quantity of petroleum-contaminated soil within the proposed KEA will be minimal. Petroleum-contaminated soil will be managed in accordance with WDEQ/SHWD regulations (WDEQ/SHWD 1998). Strata will temporarily store petroleum-contaminated soil in a designated storage area. Petroleum-contaminated soil would not be stored longer than 180 days in accordance with WDEQ/SHWD requirements for temporary storage of petroleum-contaminated soils at the point of generation. Petroleum-contaminated soils would be transported to a land farm permitted through WDEQ or another state.

4.13.1.1.2.2 TENORM

TENORM includes drilling fluids and drill cuttings from monitor wells and from the construction and development of recovery and injection wells prior to using the wells for uranium ISR. TENORM drilling fluids will be stored and disposed of on-site in mud pits, which will be constructed adjacent to the drilling pads. Following well completion the mud pits will be backfilled and graded in accordance with WDEQ/LQD regulations. TENORM groundwater produced during baseline aquifer testing activities within the proposed KEA was discharged under a temporary WYPDES permit. It is expected that other TENORM groundwater generated during the operation and decommissioning phases will be discharged in a similar manner as long as the well is not completed in an interval which could have been affected by uranium recovery operations.

4.13.1.1.2.3 Hazardous Waste

Hazardous waste may include small quantities of used batteries, expired laboratory reagents, fluorescent lightbulbs, solvents, cleaners, and degreasers. Hazardous waste will be stored in secure containers inside the maintenance shop near the Ross CPP. It is not anticipated that hazardous waste will be

accumulated or stored within the proposed KEA. The containers will be compatible with the materials stored, visually inspected for leaks, rust, etc. and will be labeled with contents. Maintenance area(s) will have a specific area that is bermed and adequately vented for hazardous waste temporary storage. Hazardous waste will be transported to an off-site treatment, storage and disposal facility that is licensed by WDEQ/SHWD or a nearby state to manage hazardous waste.

4.13.1.1.2.4 Used Oil, Oily Rags and Used Oil Filters

Used oil will be generated by motor vehicle maintenance at maintenance area(s) near the Ross CPP. It is not anticipated that used oil, oily rags or used oil filters will be accumulated or stored within the proposed KEA. Within the maintenance area(s) near the Ross CPP, used oil will be managed in accordance with EPA requirements in 40 CFR Part 279 and WDEQ/SHWD requirements for used oil generators (WDEQ/SHWD 2008). Used oil will be stored temporarily in a container that meets the WDEQ/SHWD requirements located inside or adjacent to the maintenance shop with secondary containment provided in accordance with spill prevention, control, and countermeasure (SPCC) requirements.

Used oil will be transported only by appropriately licensed transporters who have obtained EPA identification numbers; or, Strata may transport the used oil itself in containers no more than 55 gallons and in a vehicle owned by Strata subject to the provisions of 40 CFR § 279.24 and WDEQ/SHWD requirements. The used oil will be transported to a used oil collection center that is permitted through WDEQ/SHWD or another state. The used oil collection center eventually would transport the used oil to a re-refiner for recycling or burning.

Used oil filters and oily rags will be generated as result of maintenance activities in the maintenance area(s) near the Ross CPP. Used oil filters and oily rags will be accumulated in appropriately labeled containers located inside or adjacent to the maintenance shop. These will be transported by the used oil contractor to a recycling or disposal facility.

4.13.1.1.2.5 Domestic Sewage

Domestic wastewater will be collected in a gravity sewer collection system serving the office/administration building near the Ross CPP, the Ross CPP, the maintenance building near the Ross CPP, and any other buildings with restrooms. Domestic waste water will be disposed in an on-site wastewater treatment or disposal system located near the Ross CPP. It is not anticipated that any domestic sewage will be collected within the proposed KEA other than in portable toilets used during construction. The contractors supplying the portable toilets will perform maintenance, including domestic waste collection and disposal.

4.13.1.2 Potential Construction Impacts

During the construction phase, no AEA-regulated waste will be generated under the Proposed Action. Potential construction-related wastes within the proposed KEA may include all four categories of non-AEA-regulated solid waste and TENORM. Most of the TENORM (drilling fluids and drill cuttings) will also be generated during construction. Mitigation measures described in Section 5.13 of this ER will reduce the potential impacts associated with these wastes.

4.13.1.3 Potential Operation Impacts

As previously described, the Proposed Action will extend the duration but not increase the waste generation rate from the Ross ISR Project. During operation, the potential wastes generated within the proposed KEA will only include limited sources of AEA-regulated liquid and solid wastes (i.e., fluids generated from work over operations on injection and recovery wells, scale and sludge from equipment maintenance, contaminated soil and contaminated solids from ISR wells). The AEA-regulated wastes will be disposed as described in Section 4.13.1.1 of this ER.

4.13.1.4 Potential Aquifer Restoration Impacts

Similar to the Ross ISR Project, the potential waste management impacts during aquifer restoration of the Proposed Action will be similar to the operation phase. Since the workforce will decrease during aquifer restoration, the quantities of non-AEA-regulated waste will be lower than those generated during the construction and operation phases.

4.13.1.5 Potential Decommissioning Impacts

Potential waste management impacts during decommissioning will be similar to those during construction for most AEA-regulated and non-AEA-regulated wastes with the exception of TENORM (not generated during decommissioning), solid waste (generated at higher quantities during decommissioning) and 11e.(2) byproduct material (generated during decommissioning but not construction). Decommissioning wastes within the proposed KEA will be limited to wellfield equipment, module buildings, booster pump stations, and pipelines and will be properly disposed as described in Section 4.13.1.1 of this ER. The solid waste (demolition waste) will have the potential to impact the municipal landfill, which will be mitigated by coordinating with the landfill well in advance of decommissioning to ensure that sufficient capacity will be available or by transporting the demolition waste to an alternate landfill, such as a properly permitted on-site facility.

4.13.2 No Action Alternative

Under the No Action Alternative, the Ross ISR Project license would not be amended and ISR wellfields and associated infrastructure within the proposed KEA would not be constructed. Strata would not generate any wastes within the proposed KEA, and the potential waste management impacts associated with the Ross ISR Project would not be extended in duration.

Table 4.13-1. Waste Management Systems and Anticipated Quantities for the Ross ISR Project

Waste Stream	Source	Storage Location	Disposal Method(s)	Estimated Typical Quantity
AEA-Regulated Waste				
Excess Permeate	Production and restoration RO circuits	Lined retention ponds	Reinjection into wellfield, CPP make-up water, surface discharge, land application, or deep disposal wells	C: 0 gpm O: 57 gpm R: 0 gpm D: 0 gpm
Brine and Other 11e.(2) Liquid Waste	Production and restoration RO circuits, CPP, well work-over, spent eluate, process drains, contaminated reagents, filter backwash, wash down water, and decontamination showers	Lined retention ponds	Deep disposal wells and evaporation in lined retention ponds	C: 0 gpm O: 62 gpm R: 227 gpm D: <10 gpm
Solid 11e.(2) Byproduct Material	Filtrate and spent filter media, scale and sludge from equipment maintenance, contaminated soil, damaged IX resin, contaminated solids from injection/recovery wells, contaminated PPE and contaminated materials and equipment from decommissioning	11e.(2) Storage and Preparation area within CPP or other designated and restricted 11e.(2) storage area	Shipment to NRC or Agreement State licensed disposal facility	C: 0 cy O: 100 cy/yr R: 100 cy/yr D: 4,000 cy
Non-AEA-Regulated Waste				
TENORM	Drilling fluids and drill cuttings	Mud pits	On-site disposal in mud pits	C (per well): drilling fluid: 6,000 gal drill cuttings: 15 cy O,R,D: 0 gal 0 cy
Solid Waste - Industrial or Municipal Solid Waste	General office trash	Designated waste receptacles	Shipment to municipal landfill	C: 15 cy/wk O: 15 cy/wk R: 15 cy/wk D: 15 cy/wk
Solid Waste - Recyclable Solid Waste	Plastic, glass, paper, aluminum, and cardboard	Designated recycling receptacles	Shipment to municipal recycling facility or recyclable waste collection facility	C: 5 cy/wk O: 5 cy/wk R: 5 cy/wk D: 5 cy/wk

Table 4.13-1. Waste Management Systems and Anticipated Quantities for the Ross ISR Project (cont.)

Non-AEA-Regulated Waste				
Solid Waste - Construction/ Demolition Waste	Construction debris and decontaminated equipment/materials	Designated waste receptacles or waste accumulation areas	Shipment to municipal landfill	C: 5 cy/wk O: 5 cy/wk R: 5 cy/wk D: 2,000 cy
Solid Waste - Petroleum-Contaminated Soil	Equipment leaks	Designated storage area	Shipment to WDEQ/SHWD licensed disposal facility	C: <1 cy/wk O: <1 cy/wk R: <1 cy/wk D: <1 cy/wk
Hazardous Waste	Used batteries, expired laboratory reagents, fluorescent light bulbs, solvent, cleaners and degreasers	Designated hazardous waste storage area in maintenance shop	Shipment to WDEQ/SHWD licensed recycling or disposal facility except for expired laboratory reagents, which will be disposed with 11e.(2) liquid waste	< 220 lb/mo (<100 kg/mo) (C,O,R,D)
Used Oil	Vehicle and equipment maintenance	Designated used oil storage area in or adjacent to maintenance shop	Shipment to used oil recycling center	C: 5 gal/mo O: 5 gal/mo R: 5 gal/mo D: 5 gal/mo
Used Oil Filters and Oily Rags	Vehicle and equipment maintenance	Designated used oil storage area in or adjacent to maintenance shop	Shipment to used oil recycling center	C: <20 lb/mo O: <20 lb/mo R: <20 lb/mo D: <20 lb/mo
Domestic Sewage	Restrooms	Septic tank(s) near CPP and office/admin building	On-site wastewater disposal or treatment system plus holding tanks/portable toilets during construction and decommissioning	C: 2,600 gpd O: 800 gpd R: 300 gpd D: 1,200 gpd

Abbreviations:
C - Construction
O - Operation
R - Aquifer Restoration
D - Decommissioning

Table 4.13-2 Anticipated Waste Disposal Facilities for the Ross ISR Project

Waste Stream	Anticipated Disposal Facility	Type	Capacity	Agreement Required
11e.(2) Byproduct Material	Pathfinder Mine Corporation, Shirley Basin Facility, Shirley Basin, Wyoming	NRC licensed 11e.(2) byproduct material disposal facility	Unknown; the facility continues to accept 11e.(2) byproduct material from ISR facilities per NRC (2015)	11e.(2) byproduct material disposal agreement
	Denison Mines Corporation, White Mesa Uranium Mill, Blanding, Utah	Utah licensed 11e.(2) byproduct material disposal facility	Up to 5,000 cubic yards from a single source (Ross ER Section 4.13.1.1.1.4)	11e.(2) byproduct material disposal agreement
	Energy Solutions LLC, Clive Disposal Site, Clive, Utah	Utah licensed 11e.(2) byproduct material disposal facility	5.5 million cubic yards (Ross ER Section 4.13.1.1.1.4)	11e.(2) byproduct material disposal agreement
	Waste Control Specialists LLC, Byproduct Material Disposal Facility, Andrews, Texas	Texas licensed 11e.(2) byproduct material disposal facility	1.17 million cubic yards (Ross ER Section 4.13.1.1.1.4)	11e.(2) byproduct material disposal agreement
TENORM	On-site disposal	Mud pits constructed adjacent to drilling pads	Adequate capacity will be provided next to each drilling pad	None
Solid Waste - Industrial or Municipal Solid Waste	Moorcroft Landfill, Moorcroft, Wyoming	Municipal landfill	1,000 tons municipal solid waste annually (Ross ER Section 4.13.1.1.2.1)	Contract with waste disposal contractor
	Campbell County Landfill, Gillette, Wyoming	Municipal landfill	Plans for expansion in next 5 to 20 years (Burns & McDonnell 2011)	Contract with waste disposal contractor
Solid Waste - Recyclable Solid Waste	Campbell County Landfill, Gillette, Wyoming	Municipal recycling facility	200 tons per month (Campbell County Public Works 2015)	Contract with waste disposal contractor

Table 4.13-2 Anticipated Waste Disposal Facilities for the Ross ISR Project (cont.)

Waste Stream	Anticipated Disposal Facility	Type	Capacity	Agreement Required
Solid Waste - Construction/ Demolition Waste	Moorcroft Landfill, Moorcroft, Wyoming	Municipal landfill	600 tons construction debris annually (Ross ER Section 4.13.1.1.2.1)	Contract with waste disposal contractor
	Campbell County Landfill, Gillette, Wyoming	Municipal landfill	Plans for expansion in next 5 to 20 years (Burns & McDonnell 2011)	Contract with waste disposal contractor
Petroleum-Contaminated Soil	Transported by waste disposal contractor to appropriately permitted facility in northeast Wyoming such as Campbell County Landfill	Land farm	Significantly greater than the <1 cubic yard per month estimated from Ross ISR Project	Contract with waste disposal contractor
Hazardous Waste (fluorescent light bulbs, solvent, cleaners and used batteries)	Transported by hazardous waste contractor to appropriately permitted facility	Commercial recycling facility outside Wyoming	Significantly greater than the small quantity anticipated from Ross ISR Project	Contract with hazardous waste contractor
Hazardous Waste (laboratory reagents)	On-site disposal	Lined retention ponds and deep injection wells	Up to 400 gpm (Ross ER Section 4.13.1.1.1)	None
Used Oil, Oily Rags and Used Oil Filters	Tri-State Recycling Services	Commercial recycling facility	Significantly greater than the estimated 60 gallons per year from Ross ISR Project	Contract with used oil recycling contractor
Domestic sewage	On-site disposal	On-site wastewater treatment or disposal system	Adequate capacity for peak design flow rate in accordance with WDEQ/WQD requirements (Ross ER Section 4.13.1.1.2.4)	None

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5.0 MITIGATION

The following sections describe the mitigation measures that are proposed to minimize the potential impacts described in Chapter 4. Mitigation measures are described for the Proposed Action, while no mitigation measures will be implemented for the No Action Alternative, since the Ross ISR Project license would not be amended and ISR wellfields and associated infrastructure within the proposed KEA would not be constructed. Since this ER is written for consistency with NUREG-1748, the following sections describe the mitigation measures that will be used to reduce or eliminate potential impacts associated with the Proposed Action. The mitigation measures discussed in this section are based on those described in the Ross ER and SUA-1601 license conditions. Final selection of some mitigation measures will be incorporated into the appropriate ancillary permit applications. Examples include sediment and erosion control BMPs addressed in SWPPPs reviewed and approved by WDEQ/WQD, air quality BACT reviewed and approved by WDEQ/AQD, and jurisdictional wetland mitigation measures reviewed and approved by USACE.

5.1 Mitigation of Potential Land Use Impacts

Disturbed lands within the proposed KEA will be returned to their pre-existing land use (Section 3.1 of this ER) and decommissioned and reclaimed for unrestricted release consistent with 10 CFR Part 40, Appendix A, Criterion 6(6). As stated in Section 4.1 of this ER, the surface disturbance associated with the Proposed Action will encompass approximately 1,050 acres, or about 13% of the proposed KEA. The following summarizes Strata's proposed mitigation plan for potential land use impacts during construction, operation, aquifer restoration, and decommissioning.

5.1.1 Mitigation of Potential Construction Impacts

Mitigation measures to minimize potential construction impacts to land use are described below.

Changing and Disturbing Existing Land Uses

Strata will minimize changing and disturbing existing land uses through the following mitigation measures:

- Restoring and re-seeding disturbed areas promptly, typically within one construction season
- Coordinating construction efforts with the oil production companies and agricultural producers operating within the proposed KEA to ensure that Strata causes no interruptions in activities
- Using existing county roads and oilfield access roads wherever possible to minimize access road construction
- Following existing topography during road construction to minimize cut and fill
- Minimizing secondary and tertiary access road width
- To the extent possible, locating access roads, pipelines, and utilities in common corridors

Access Restrictions and Establishment of Right-of-Way

Strata will minimize access restrictions and potential impacts from establishment of right-of-way through the following mitigation measures:

- The maximum fenced area will include all wellfield modules (11% of the proposed KEA). Due to phased wellfield development, the actual fenced area will be less.
- Coordinating construction efforts with the oil production companies and agricultural producers operating within the proposed KEA to ensure that Strata causes no interruptions in activities

Mineral Rights

The only other known mineral in the proposed KEA is conventional oil. Strata will mitigate potential impacts to mineral rights by working with the oil production companies operating within the proposed KEA to temporarily provide an alternate supply of water or alternate method of EOR that does not involve extracting water from the ore zone within the proposed KEA until the portion of the ore zone aquifer affected by these water supply wells has been depleted of uranium. At that time, subject to approval by NRC and WDEQ, water removal from the ore zone for EOR could resume, restoring the prior use of this water and possibly expediting aquifer restoration by enhancing groundwater sweep and providing another water disposal option.

Livestock Grazing and Agricultural Production

Strata will mitigate potential impacts to livestock grazing and agricultural production through the following measures:

- Restoring and re-seeding disturbed areas promptly, typically within one construction season
- Fencing less than 11% of the proposed KEA
- Establishing surface use agreements with surface owners/lessees to provide mitigation or compensation for temporary loss of areas currently used for livestock grazing or crop production
- Avoiding cultivated fields, where possible, when constructing monitor wells and other facilities

Restrictions on Recreational Activities

Strata will mitigate potential impacts to recreational activities through the following measures:

- Fencing less than 11% of the proposed KEA, which will limit disruptions to big game migration, although fencing will allow wildlife passage
- Restoring and re-seeding disturbed areas promptly, typically within one construction season

5.1.2 Mitigation of Potential Operation and Aquifer Restoration Impacts

Mitigation measures that are specifically designed to address potential land use impacts during operation and aquifer restoration include the following:

- Working with the oil production companies operating within the proposed KEA to temporarily provide an alternate supply of water or alternate method of EOR that does not involve extracting water from the ore zone within the proposed KEA (refer to Section 5.4 of this ER) until uranium recovery from that portion of the wellfield is completed

5.1.3 Mitigation of Potential Decommissioning Impacts

The following sections describe the mitigation measures that will be implemented during decommissioning to ensure that there are no long-term impacts to land use within the proposed KEA.

5.1.3.1 Access Road Reclamation

All secondary, tertiary, and temporary access roads constructed for access to the wellfields will be removed and reclaimed unless exempted from reclamation by the request of landowners/lessees, in which case the landowners/lessees will assume responsibility for their long term maintenance and ultimate reclamation.

Prior to reclamation, any contamination that resulted from ISR facility construction or operation will be remediated to appropriate NRC standards (10 CFR Part 40, Appendix A, Criterion 6(6)) and the contaminated material disposed at a licensed disposal facility. All contaminated soil or gravel that is determined to be 11e.(2) byproduct material will be disposed at a licensed 11e.(2) byproduct material disposal facility per LC 9.9 of SUA-1601, while petroleum-contaminated soil will be disposed at a WDEQ/SHWD licensed facility. Removal of roads will be accomplished by removing excess imported road surfacing material and ripping the road surface and shallow subsoil to

loosen the subsoil. Culverts will be removed and pre-construction drainages re-established. The area will be graded to a contour consistent with the surrounding landscape. Topsoil will be re-spread in a uniform manner and the area revegetated.

5.1.3.2 Wellfield Decommissioning

Wellfield decommissioning will be ongoing as wellfield modules receive regulatory approval for successful aquifer restoration. Wellfield decommissioning includes the plugging and abandonment of all wells and the removal, decontamination and disposal of wellfield piping and appurtenances.

All wells no longer required for ISR uranium recovery or aquifer restoration will be plugged and abandoned in accordance with the procedures described in Ross TR Addendum 2.6-E. These procedures have been prepared to comply with Wyoming Statute WS 35-11-404 and Chapter 8, Section 8 of the WDEQ/LQD Rules and Regulations. Plugging and abandonment procedures will include removing any piping, pumps, and equipment suspended in the well casing, filling the casing from the total depth to just below the ground surface with cement grout or high solids bentonite, cutting off the surface casing below ground, and restoring and re-seeding the disturbed surface area.

Wellfield equipment will be removed, including injection and recovery well individual flow lines, buried electrical cable, and well head covers. Trunk lines, feeder lines, valve vaults, module buildings, and booster pump stations will also be removed. Strata anticipates that all downhole pipe and electrical cable, individual well flow lines, feeder lines, trunk lines, and valves will be disposed as 11e.(2) byproduct material. Mitigation measures for minimizing the quantity of 11e.(2) byproduct material during decommissioning are addressed in Section 4.13 of this ER and include using a chipper or shredder to reduce the volume of wellfield materials by 50% or more. Wherever possible, equipment will be decontaminated for unrestricted release, including disposal in a nearby municipal landfill or re-use in another ISR facility. Strata anticipates that this will include the module buildings and booster pump stations. Additional information about the fate of wellfield equipment during decommissioning is presented in Section 4.2 of this ER (potential transportation impacts) and Section 4.13 of this ER (potential waste management impacts).

5.1.3.3 Final Contouring

All disturbed areas will be re-contoured as necessary to blend in with the natural terrain and consistent with the pre-construction topography. Any affected drainage channels will also be restored to pre-construction conditions during decommissioning.

5.1.3.4 Topsoil Replacement

Suitable topsoil within the disturbed areas will be salvaged in accordance with WDEQ/LQD guidelines and conditions of the Strata's WDEQ/LQD Permit to Mine No. 802. The topsoil stripping depth will vary throughout the proposed KEA but is expected to average 1.20 feet, as determined from baseline soil survey results described in Section 3.3 of this ER. Additional information about topsoil stockpiling is provided in Section 5.3 of this ER.

During decommissioning, topsoil will be redistributed on disturbed areas to a depth approximately equal to pre-construction conditions. As needed, the subsoil will be ripped to minimize compaction prior to topsoil replacement. As described in Section 5.3 of this ER, Strata has been employing various methods of soil reclamation according to landowner preference during regional baseline monitoring and exploratory drilling. These methods have included ripping compacted soil with the teeth of a grader, loosening compacted soil with a disc, or simply replacing topsoil and re-seeding. These techniques will continue to be refined and coordinated with WDEQ/LQD and the affected landowners.

5.1.3.5 Revegetation

Disturbed areas will be revegetated in accordance with the NRC-approved RAP as well as Strata's approved WDEQ/LQD Reclamation Plan for the Ross ISR Project, which will be modified to include the proposed KEA. As previously discussed, topsoil stockpiles will be seeded to minimize wind and water erosion. After replacing topsoil, disturbed areas will be revegetated by seeding with a seed mix developed through discussions with WDEQ/LQD and area landowners. Seeding will be conducted by drill or broadcast methods depending upon the type of seed being planted. The Reclamation Plan in Strata's WDEQ/LQD Permit to Mine No. 802 will address the types and quantities of mulch and seasonal revegetation restrictions.

The extended reference area concept, as defined in WDEQ/LQD Guideline No. 2, will be used to evaluate the success of revegetation. The extended reference area means all of the undisturbed portions of a vegetation type, which has experienced disturbance in any phase of the ISR process. At the end of decommissioning, quantitative vegetation data for extended reference areas representing each disturbed vegetation type will be directly compared by statistical analysis to quantitative vegetative data from reclaimed vegetation types. WDEQ/LQD requires a confidence level of 80% with no mathematical adjustments for climatic change. Qualitative comparisons between extended reference areas and reclaimed areas will also be required for each disturbed vegetation type. WDEQ/LQD will be consulted when choosing the extended reference area and when selecting the standard procedures for qualitative comparisons. Prior to release of the WDEQ/LQD reclamation bond, Strata will demonstrate revegetation success through quantitative and qualitative comparisons between external reference areas and reclaimed areas for each disturbed vegetation type.

5.2 Mitigation of Potential Transportation Impacts

The following sections present mitigation measures for potential transportation impacts. Potential transportation impacts associated with the Proposed Action are described in Section 4.2 of this ER and consist of access road construction and traffic.

5.2.1 Mitigation of Potential Access Road Construction Impacts

Potential impacts resulting from the construction of the secondary and tertiary access roads are described in Section 4.2.1.1 of this ER. Temporary, minor impacts from road construction could potentially occur to land use, soils, water resources, vegetation and wildlife, air quality, noise, historic and cultural resources, and visual and scenic resources. Mitigation measures for potential impacts from road construction at the proposed KEA are the same as were approved for the Ross ISR Project. The mitigation measures for each of the resource areas are described below.

Land Use

Mitigation measures to minimize changing and disturbing land use include:

- Implementing a one-way in/one-way out driving approach, where sequentially developed wellfield modules will be accessed through previously developed modules wherever possible
- Using existing county roads and oilfield access roads wherever possible to minimize access road construction
- Following existing topography during access road construction to minimize cut and fill
- Minimizing secondary and tertiary access road width
- Restoring and re-seeding disturbed areas promptly, typically within one construction season
- Coordinating construction efforts with the oil production companies operating within the proposed KEA to ensure that Strata causes no interruptions in oil production activities
- Locating access roads, pipelines, and utilities in common corridors

Soils

Mitigation measures to potential soil impacts include:

- Using existing county roads and oilfield access roads wherever possible to minimize access road construction
- Minimizing secondary and tertiary access road width
- Restoring and re-seeding disturbed areas promptly, typically within one construction season
- Implementing erosion control BMPs such as silt fence, sediment logs, and straw bale check dams
- Ripping compacted soil during reclamation, as necessary, and continuing to refine soil reclamation techniques developed during pre-application baseline monitoring and exploratory drilling
- Removing soil contaminated by leaks or spills and transporting the contaminated soil to a licensed disposal facility

Water Resources

Mitigation measures to potential water resources impacts, especially surface water and aquatic resources, include:

- Minimizing surface water crossings and, where surface water crossings are necessary, constructing the access road perpendicular to the direction of flow to minimize disturbance
- Including culverts capable of passing the runoff resulting from the 10-year, 24-hour precipitation event in secondary access road stream channel crossings in accordance with WDEQ/LQD Guideline 8
- Implementing sediment control BMPs such as silt fence, sediment logs, and straw bale check dams
- Developing and implementing a spill response plan to contain any spill that occurs during access road construction and clean up affected soil or water
- Avoiding wetlands during access road construction or, where unavoidable impacts will occur such as stream channel crossings, mitigate impacts by enhancing existing wetlands or constructing new wetlands in accordance with USACE requirements

Vegetation and Wildlife

Mitigation measures to potential ecological resources impacts include:

- Implementing dust abatement BMPs such as wetting disturbed areas and gravel access roads
- Implementing speed limits on access roads within the proposed KEA
- Avoiding sensitive areas such as wetlands and habitats during access road construction

Air Quality

Mitigation measures to reduce potential air quality impacts, including vehicle emissions and dust, include:

- Minimizing disturbed areas by minimizing access road widths, utilizing existing county and oilfield roads where possible, and implementing a one-way in/one-way out policy
- Implementing dust abatement BMPs such as wetting disturbed areas and gravel access roads
- Implementing speed limits on access roads within the proposed KEA

Noise

Mitigation measures to reduce potential noise impacts include:

- Implementing speed limits on access roads within the proposed KEA
- Restricting access road construction activities during nighttime hours

Visual and Scenic Resources

Mitigation measures to reduce potential visual and scenic resource impacts include:

- Constructing secondary and tertiary access roads along existing topography to minimize cut/fill and reduce the visual contrast created by straight roads
- Minimizing disturbed areas by minimizing access road widths, utilizing existing county and oilfield roads where possible, and implementing a one-way in/one-way out policy

- Implementing speed limits on access roads within the proposed KEA

5.2.2 Mitigation of Potential Traffic Impacts

Section 4.2 of this ER stated that the Proposed Action will extend in duration but not increase the magnitude of the traffic evaluated for the Ross ISR Project. As described in Section 3.2 of this ER, Strata currently has an MOU with Crook County for improvement and maintenance of Crook County roads providing access to the Ross ISR Project. Strata will work with Crook County to modify the MOU to include the proposed KEA, as necessary. The potential mitigation measures to reduce potential traffic impacts described in the MOU include:

- Educate Strata employees and contractors on speed limits, potential hazards for sightseers, local traffic and wildlife
- Provide dust control as required by the Air Quality Permit No. CT-12198, which will be modified to include the proposed KEA (as described in Section 4.6 of this ER)
- Reviewing all potential accesses to country roads before the roads are built to ensure safe access
- Complying with the county's Set Back Policy, ensuring that structures, wind breaks and screening are set back far enough from County roads
- Require employees, contractors, and vendors comply with the County Size and Weight Limit Resolution
- Obtain appropriate permits to cross the County road with pipelines or other utilities
- Maintain and repair damage to County roads caused by Strata (including contractors)

As described in Ross ER Section 5.2.2, Strata will also investigate the feasibility of a park and ride system from local towns as appropriate. In addition, Strata will also encourage vendors and contractors to carpool.

5.3 Mitigation of Potential Geology and Soils Impacts

5.3.1 Mitigation of Potential Geologic Impacts

The potential geologic impacts from the Proposed Action include the very low risk of hydraulic fracturing during operation of the Class III injection wells in the ore zone. Mitigation measures to minimize impacts to shallow geologic features include maintaining the injection pressure at a level that does not exceed the fracture gradient of the receiving formation as required by LC 10.14 of SUA-1601.

5.3.2 Mitigation of Potential Soil Impacts

Mitigation measures for potential soil impacts are described in terms of the five potential impact categories presented in Section 4.3 of this ER: soil loss, soil compaction, salinity, loss of soil productivity, and soil contamination.

5.3.2.1 Soil Loss Mitigation Measures

Potential soil loss impacts will be minimized by implementing BMPs related to topsoil handling, storm water control, sediment control, and wind erosion protection.

Topsoil and Subsoil Handling

Topsoil will be salvaged prior to surface disturbance activities from module buildings, laydown areas, booster pump stations, and secondary access roads in accordance with WDEQ/LQD guidelines and conditions of the Strata's WDEQ/LQD Permit to Mine No. 802. Areas to be stripped will be staked and typical earth moving equipment, such as rubber tired scrapers, will be used for stripping and stockpiling. The topsoil stripping depth will vary but is expected to average about 1.20 feet, as described in Section 3.3 of this ER.

Several stockpiles will be used for the temporary storage of topsoil material. Topsoil management will be conducted in accordance with WDEQ/LQD rules and regulations and guidance. Stockpiles will be located on the leeward side of hills, when available, to minimize wind erosion. Topsoil stockpiles will not be located in drainage channels or other locations that could lead to a loss of material. Topsoil stockpiles in the wellfield will be located near access roads approximately 2,000 feet apart. All stockpile slopes will be built

with side slopes of 3H:1V or flatter, and stockpiles will be clearly marked with a "topsoil" label and unique ID. Traffic flow during stockpiling and re-spreading will be minimized to reduce compaction. Each topsoil stockpile will be seeded during inactive periods with an appropriate perennial seed mix to prevent wind and water erosion. A ring ditch and water collection sump will also be constructed around each topsoil stockpile to trap sediment.

During excavation of mud pits associated with well construction, exploration drilling, and delineation drilling activities, topsoil will be separated from the subsoil with a backhoe. The topsoil will be removed and placed in a separate temporary stockpile, while the subsoil is removed and deposited next to the mud pit. When the use of the mud pit is complete, usually within 30 days, the subsoil will be re-deposited in the mud pit followed by replacement of topsoil.

Pipeline and utility trench construction follows a similar procedure. The topsoil and subsoil will be stored separately, typically on opposite sides of the trench, with the topsoil being placed on top of the subsoil after the trench has been backfilled. Alternately, the topsoil may also be bladed to the side to allow for pipeline or utility installation and then bladed back after construction is complete.

Revegetation

Disturbed areas will be revegetated in accordance with the NRC-approved RAP as well as Strata's WDEQ/LQD Permit to Mine No. 802 for the Ross ISR Project, which will be amended to include the proposed KEA. As previously discussed, topsoil stockpiles will be seeded to minimize wind and water erosion. After replacing topsoil, disturbed areas will be revegetated by seeding with a preselected seed mix. The seed mixture will be developed through discussions with WDEQ/LQD and area landowners. Seeding will be conducted by drill or broadcast methods depending upon the type of seed being planted. The WDEQ/LQD-approved Reclamation Plan will address the types and quantities of mulch and seasonal revegetation restrictions. The extended reference area concept discussed in Section 5.1.3.5 of this ER will be used to determine the success of Strata's revegetation effort.

Storm Water Control

Potential soil loss from storm water will be minimized by implementing engineering controls to route storm water away from disturbed areas. Culverts will be designed to pass runoff resulting from the 10-year, 24-hour precipitation event where secondary access roads cross ephemeral and intermittent stream channels in accordance with WDEQ/LQD Guideline 8.

Sediment Control

Sediment control mitigation measures will be implemented in all disturbed areas to minimize soil loss and water quality impacts from sediment transport. Mitigation measures include:

- Avoiding construction or minimizing disturbance in sensitive areas, such as next to stream channels and wetlands
- Using temporary sediment control BMPs such as silt fence, sediment logs, and straw bale check dams. Silt fence will typically be used at the toes of disturbed slopes to trap sediment. Sediment logs and straw bale check dams will typically be used in disturbed drainages to capture sediment.
- Incorporating wing ditches and water collection sumps into topsoil stockpiles
- Restoring and re-seeding disturbed areas promptly, typically within one construction season

Wind Erosion Protection

Mitigation measures designed to minimize soil loss from wind erosion include:

- Wetting exposed soil during construction
- Restoring and re-seeding disturbed areas promptly, typically within one construction season

5.3.2.2 Soil Compaction Mitigation Measures

Potential soil compaction impacts will be minimized by using existing roads where possible. Three county roads traverse the proposed KEA, and numerous private oilfield access roads are found throughout the proposed KEA. These will be used by Strata during all project phases. In addition, Strata

will minimize secondary access road widths and implement a one-way in/one-way out policy to access wellfield modules. Refer to Section 5.2 of this ER for more details.

Areas that undergo compaction, such as access roads, may be ripped, as needed, to a minimum depth of 2 feet during decommissioning. Strata has been employing various methods of soil reclamation during regional baseline monitoring and exploratory drilling. The methods have been selected by the affected landowners and have included ripping compacted soil with the teeth of a grader or tractor, loosening compacted soil with a disc, or simply replacing topsoil and re-seeding. These techniques will continue to be refined and coordinated with WDEQ/LQD and the affected landowners.

5.3.2.3 Soil Salinity Mitigation Measures

As appropriate, Strata will sample soil salinity beneath and adjacent to access roads during decommissioning. Any salt-affected soil will be removed.

5.3.2.4 Loss of Soil Productivity Mitigation Measures

Strata will implement the following mitigation measures to minimize potential loss of soil productivity:

- Segregating topsoil from subsoil during construction
- Protecting topsoil stockpiles from wind and water erosion (see Section 5.3.2.1 of this ER)
- Seeding topsoil stockpiles during inactive periods with an appropriate perennial seed mix
- Redistributing topsoil and applying a permanent seed mix approved by WDEQ/LQD during decommissioning
- Comparing revegetated areas with extended reference areas using a statistical, quantitative comparison and a qualitative comparison as approved by WDEQ/LQD

5.3.2.5 Soil Contamination Mitigation Measures

Soils in the wellfield and along pipelines could be contaminated by spills or leaks during the various project phases. During wellfield construction, potential soil contamination impacts from drilling fluid and drilling mud will be minimized by directing drilling fluids and muds into mud pits to control the

spread of fluids. During work over operations, contaminated liquids from production and injection wells will be contained in portable tanks and transported to the lined retention ponds at the Ross CPP for disposal. Minor fuel and oil leaks will be promptly cleaned up and contaminated soil removed and disposed off-site in a land farm permitted through WDEQ/SHWD or in an appropriately permitted facility in another state.

SOPs for mitigating potential impacts for leaks and spills will be developed pursuant to LC 10.4 of SUA-1601. Soils contaminated with process fluids resulting from spills or leaks will be sampled, removed, and transported as necessary to an appropriately licensed 11e.(2) byproduct material disposal facility. Soil survey and cleanup methods are described in Ross TR Section 6.4. These include assessing the background uranium and radium concentrations of the soil during pre-operational monitoring, using hand-held radiological survey instrumentation and GPS-based gamma surveys to guide soil remediation efforts, removing contaminated soil and transporting it to a licensed disposal facility, performing post-cleanup analysis of uranium and radium concentrations in the soil, and comparing the concentrations to 10 CFR Part 40, Appendix A, Criterion 6(6) cleanup standards. Strata will maintain documentation of all spills of source and byproduct material (including process solution) in accordance with LC 11.6 of SUA-1601. The documentation is required to include the date, spill volume, total activity of each radionuclide released, radiological survey results, soil sample results, corrective action, results of post remediation surveys, a map showing the spill location and the impacted area, and an evaluation of NRC reporting criteria.

5.4 Mitigation of Potential Water Resources Impacts

This section summarizes Strata's proposed mitigation measures to avoid or reduce potential impacts described in Section 4.4 of this ER. Monitoring activities associated with the mitigation measures are discussed in Section 6.2 of this ER.

5.4.1 Mitigation of Potential Surface Water Impacts

Several of the mitigation activities for surface water impacts are similar to those presented in Sections 5.1 and 5.3 of this ER. In general, Strata will minimize surface water impacts by limiting soil disturbance and compaction, diverting and controlling runoff, avoiding or promptly detecting and correcting accidental spills and leaks and completing reclamation in a timely manner.

5.4.1.1 Erosion and Sedimentation

The greatest potential for erosion and sedimentation will occur during the construction and decommissioning phases of the project. To mitigate soil loss Strata will minimize the surface disturbance to soil and vegetation by using existing roads where possible, limiting secondary and tertiary access road widths, locating access roads adjacent to pipeline and utility corridors where possible, and revegetating disturbed areas promptly, typically within one construction season. Topsoil handling and replacement, final contouring, vegetation reclamation, and access road removal and reclamation are discussed in detail in Sections 5.1 and 5.3 of this ER.

Mitigation measures for erosion and sedimentation during construction are addressed in the storm water pollution prevention plan (SWPPP) submitted to WDEQ/WQD for the Ross ISR Project. WDEQ/WQD reviewed the SWPPP and issued WYPDES Permit No. WYR104738 for large construction activities, effective January 17, 2013. Strata will modify the SWPPP as necessary to include the proposed KEA. The SWPPP describes the nature and sequence of construction activities, identifies potential sources of pollution, and describes BMPs to be used, including erosion and sediment controls as well as operational controls such as inspections.

Prior to uranium recovery operations in the Ross ISR Project, Strata will apply to WDEQ/WQD for coverage under the Industrial General WYPDES Storm Water Permit or an individual storm water permit. As part of the

application, Strata will update the existing SWPPP or prepare a new SWPPP that describes erosion and sediment controls as well as operational controls that will be used during operation to ensure that storm water discharges from the facility do not cause a violation of surface water quality standards (i.e., Chapter 1 of the Wyoming Water Quality Rules and Regulations). Qualified Strata personnel will inspect storm water BMPs semiannually or as required by the WYPDES storm water permit and maintain inspection reports on file. The SWPPP will be updated as needed, such as in response to potential problems identified during inspections or changes in operation (e.g., transition from operation to aquifer restoration). Prior to commencing operations in the proposed KEA, Strata will modify the WYPDES permit as necessary to include the proposed KEA.

5.4.1.2 Flood Protection

Flood protection mitigation measures for the proposed KEA will be the same measures approved for the licensed Ross ISR Project. These mitigation measures are described in Ross TR Section 3.1.9 and in correspondence between NRC staff and Strata (NRC 2014). Drainage structures will be designed to route storm water runoff away from structures and roads. Storm water management will be conducted in accordance with the SWPPP(s) prepared in support of the construction and industrial WYPDES permits required by WDEQ/WQD. One of the key features of the SWPPP(s) is demonstrating how BMPs are designed to minimize exposure to pollutants. This will be accomplished in part through flood protection. It will also involve erosion and sediment control measures described previously and secondary containment measures at the Ross CPP.

Protection of equipment and facilities from large runoff events will be accomplished by placement out of the existing deeply incised drainage channels. When wells or other facilities must be placed within the 100-year flood inundation area, proper engineering controls will be used to ensure safety and environmental protection. Similar to the Ross ISR Project, the injection, recovery and monitor wells will be protected from flooding by installation of cement seals around the well casings and use of watertight well caps.

5.4.1.3 Aquatic Resources Encroachment

Construction within the proposed KEA has the potential to impact up to 8 acres of aquatic resources. Impacts to aquatic resources will be mitigated, as required by USACE, by enhancing existing wetlands or constructing new wetlands. Prior to disturbing any USACE-verified wetlands identified in the wetlands delineation report (refer to Section 3.4.2 of this ER), Strata will apply for coverage under an appropriate USACE NWP for specific construction activities such as pipeline installation and access road stream channel crossings. As part of the application, Strata will provide a site-specific mitigation plan for project-related disturbance of jurisdictional wetlands. Depending on the nature of the anticipated wetlands disturbance, mitigation may include reestablishing temporarily disturbed wetlands in place, enhancing other existing wetlands, or constructing additional wetland areas in circumstances where disturbance will be long term. Mitigation measures will ensure that the Proposed Action does not result in a net loss of wetlands.

5.4.1.4 Spills and Leaks

Spills and leaks could occur at the proposed KEA in the pipelines, wellheads, wellfield module buildings, and booster pump stations. In such an event, operational controls and alarms will signal an alarm (e.g., low pipeline pressure or water in a sump) at the Ross CPP. In addition to the operational controls, spills and leaks would be mitigated by conducting weekly visual inspections of the wellfield piping, wellheads, module buildings and booster pump stations as required by LC 10.14 of SUA-1601 and discussed in Section 5.3 of the KEA TR. Strata will also implement spill control and cleanup SOPs in accordance with LC 10.4 of SUA-1601.

In the event of a leak or spill at wellheads, module buildings and booster pump station fluids will be contained and captured by secondary containment structures as discussed in Section 3.1.4 of the KEA TR and Ross TR Section 3.1.7. Captured fluids will be transported to the lined retention ponds at the Ross CPP for disposal. The environmental impact of a spill or leak could result in some soils being contaminated, requiring controlled disposal. All areas affected by such a failure or leak would be surveyed and any contaminated soils or material would be removed and disposed in accordance with NRC and State requirements. If contamination is detected, the soil will be sampled and analyzed for the appropriate radionuclides prior to removal and disposal.

Strata will document spills in accordance with LC 11.6 of SUA-1601. Spills meeting the criteria listed in 10 CFR Part 20, Subpart M and 10 CFR § 40.60 will be reported to NRC.

5.4.1.5 Surface Discharges

Potential erosion and water quality degradation impacts resulting from controlled discharge to the surface (e.g., aquifer test discharge or pipeline pressure testing discharge) will be mitigated by Strata. Prior to discharging to the surface, Strata will have coverage under a temporary WYPDES. The permit will limit flow rates and effluent concentrations based on the classification of the receiving stream. To minimize erosional impacts Strata will utilize energy dissipation devices to convey the discharge water into the receiving channel at a non-erosive velocity.

5.4.2 Mitigation of Potential Groundwater Impacts

Mitigation measures for potential groundwater impacts from the approved Ross ER are being incorporated by reference, herein. The following sections describe those mitigation measures.

5.4.2.1 Groundwater Quantity

Section 4.4.2 of this ER describes potential impacts to water quantity in the surficial (SA) aquifer, shallow monitoring (SM) aquifer, ore zone (OZ) aquifer, and the deep monitoring (DM) aquifer. The following sections describe mitigation measures designed to prevent or limit impacts to water quantity in the various aquifers.

5.4.2.1.1 Mitigation of Potential Groundwater Quantity Impacts in the SA, SM and DM Aquifers

Potential impacts to groundwater quantity in the SA, SM, and DM aquifers are expected to be small or negligible during all project phases. For example, groundwater modeling predicts that the estimated maximum drawdown in the SM aquifer may be 10 to 25 feet inside of the proposed KEA boundary. Given that the amount of available head measured in the SM unit ranges from 115 feet to 520 feet, a worst-case scenario (least amount of available head and maximum drawdown) results in a 21.7% decrease in the amount of head available. Mitigation measures to minimize water quantity

impacts in the SM and DM intervals include properly abandoning exploration and delineation boreholes, limiting over-penetration during drilling, employing on-site engineering and/or geologic supervision during well drilling and development, using proper well construction techniques, and implementing an approved MIT program. These will also limit potential water quality impacts in adjacent intervals. Each of these is described below.

Abandoning Exploration and Delineation Boreholes

In accordance with LC 10.12 of SUA-1601, Strata will attempt to locate and abandon all historical drill holes located within the perimeter monitor well ring prior to conducting tests for a wellfield data package. Plugging and abandonment procedures are described in Addendum 2.6-E of the approved Ross TR, which comply with Wyoming Statute WS-35-11-404 and Chapter 8, Section 8 of the WDEQ/LQD Rules and Regulations.

Limiting Over-Penetration into DM Aquifer

A key characteristic of the hydrologic isolation program is limiting over-penetration during drilling programs. Both Strata and predecessors rarely drilled beyond 20 feet into the basal shale, thereby decreasing the potential for communication between the OZ aquifer and the underlying DM interval. Strata will use geologic data (currently existing of information from more than 2,000 exploration and delineation holes) to accurately determine total depths and prevent over-penetration into underlying intervals.

Drilling Supervision

Strata will employ on-site geologic/engineering oversight during any drilling project for all phases of well drilling, installation and abandonment.

Well Construction Techniques

When constructing injection, recovery, and monitor wells, Strata will employ methods approved by WDEQ/LQD and in compliance with WDEQ/LQD Non-Coal Chapter 11, Section 6 construction requirements for well locations, casing types and, most importantly, annular sealing techniques. PVC centralizers will be placed on the casing string at a maximum spacing of one per 40 feet. Proper annular sealing methods ensure that vertical migration pathways are not created outside of the casing and inside of the borehole walls. Key characteristics of the well installation programs would include a sufficiently sized borehole diameter to provide adequate annular space for

sealing materials, selection of appropriate annular seal materials such as cement, displacement of the cement slurry sufficient to fill the entire annular volume from the bottom of the casing to ground surface, allowing sufficient curing time so that additional well construction work does not jeopardize the annular integrity, and selection of casing type with sufficient strength and diameter to prevent collapse and to accommodate the necessary injection pressures. Any fall-back from the surface of the annular seal material will be remedied by 'topping-off' the well to the ground surface.

Mechanical Integrity Testing Program

Strata will implement an approved MIT program for all Class III wells to ensure casing integrity in accordance with LC 10.5 of SUA-1601. Key characteristics of the MIT program include using a pressure-based testing method, a proactive testing program that targets wells displaying anomalous pressures or characteristics, and retesting every 5 years a well is in use and any time a well is re-entered by a drill bit or underreaming tool. The MITs will be reported semi-annually to NRC in accordance with LC 11.1(C) of SUA-1601. In the unlikely event that a well fails MIT, it would either be repaired or abandoned using approved procedures. Monitor wells that fail MIT will be promptly replaced.

5.4.2.1.2 Mitigation of Potential Groundwater Quantity Impacts in the OZ Aquifer

Section 4.4.2.2.4 of this ER describes potential groundwater quantity impacts to the OZ aquifer within and adjacent to the proposed KEA. Based on groundwater modeling results, the OZ aquifer is predicted to see significant drawdowns during operation and aquifer restoration within and adjacent to the proposed KEA. The conservative regional impact analysis conducted through the groundwater modeling indicates potential impacts to the amount of available head in wells utilized for stock, domestic and industrial use. However, the results will be localized and short-lived. The following mitigation measures will be used to minimize potential groundwater quantity impacts in the OZ aquifer.

EOR Water Supply Wells

Strata plans to mitigate the potential impacts to the six EOR water supply wells that may be impacted by working with the oil production

companies to temporarily provide an alternate supply of water or an alternate method of EOR that does not involve extracting water from the ore zone within the proposed KEA until the portion of the ore zone aquifer affected by those water supply wells has been depleted of uranium. At that time, subject to approval by NRC and WDEQ, water removal from the ore zone for secondary oil recovery could resume, restoring the prior use of this water and possibly expediting aquifer restoration by enhancing groundwater sweep and providing another water disposal option. For three of the wells (789V State, 19XX State, and 22X-19) the groundwater model analyses included a hypothetical alternate water supply well (Alt Supply Deadman) located on Strata owned property that would temporarily provide water and allow these wells to be plugged and abandoned when ISR operations were in the vicinity of the wells. The results of the groundwater model demonstrated that this approach is feasible and eliminates interference between EOR and ISR. Strata understands that two of the water supply wells, Sophia #1A and WSW#1 West Kiehl Unit are not currently used for EOR. Therefore, it may not be necessary to provide alternate water supply sources for all of the potentially impacted EOR wells. Strata will work with each oilfield operator on a case-by-case basis to minimize impacts to their operations by providing suitable alternative water sources.

Nearby Stock and Domestic Wells

Four stock and domestic wells completed in the OZ aquifer east of the proposed KEA are predicted to experience drawdown during the operation and aquifer restoration phases. The most significant predicted drawdown occurs in the Wesley #1 well, as described in Section 4.4.2.2.4 of this ER. The model predicted drawdown does not consider the contribution from the alluvial aquifer; therefore, impacts to the Wesley #1 well are likely over-estimated. Measures designed to limit or mitigate potential impacts to nearby stock and domestic wells include the following:

- Modifying wells suspected of experiencing drawdown with a sounding tube or similar device to allow periodic water level measurement,
- Lowering a well pump in an affected well,
- Providing an alternate water source for EOR as described above to limit cumulative impacts, and

- Providing an alternate source of water of equal or better quality and quantity subject to Wyoming State water law should Strata's activities prevent full use of a well.

Minimizing Consumptive Use

The following mitigation measures will ensure that consumptive use of groundwater is minimized during operation and aquifer restoration:

- Designing wellfields to enable balancing,
- Minimizing the production bleed through continuous adjustments to injection and recovery rates in order to keep the wellfield balanced while simultaneously limiting the amount of production bleed necessary to maintain an inward hydraulic gradient. This will also limit potential excursions, which would result in consumptive use during over-production to recover fluids outside of the ore zone,
- Employing two stages of reverse osmosis (RO) at the Ross CPP to treat production bleed and restoration fluids,
- Treating water recovered during groundwater sweep,
- Employing limited groundwater sweep,
- Groundwater sweep may be used selectively (e.g., around the perimeter of the module) rather than throughout the entire module to maximize benefits while minimizing consumptive use of groundwater.

5.4.2.2 Groundwater Quality

Impacts to groundwater quality in the ore zone will be mitigated by conducting groundwater restoration activities as required by LC 10.6 of SUA-1601. A detailed discussion of the approved groundwater restoration program for the Ross ISR Project is provided in Ross TR Section 6.1 and in the NRC-approved RAP included as Ross TR Addendum 6.1-A. The aforementioned requirements are incorporated by reference into this ER and are summarized below.

In accordance with LC 10.6 of SUA-1601, groundwater will be restored to the numerical groundwater protection standards as required by 10 CFR 40, Appendix A, Criterion 5B(5) on a parameter-by-parameter basis using best practicable technology (BPT). If the restoration activities are unable to achieve the Commission-approved background (CAB) or maximum contaminant levels (whichever is greater) in Criterion 5B(5), Strata will submit a license

amendment application request for NRC approval of an alternate concentration limit (ACL) pursuant to Criterion 5B(6).

CAB concentrations (pursuant to Criterion 5B(5)(a) of 10 CFR Part 40, Appendix A) would be established for each mine unit after sampling representative ore zone monitor wells per LC 11.3(A) of SUA-1601. The CAB concentrations would be established on a parameter-by-parameter basis using either the wellfield, sub-set of the wellfield or well-specific mean or another statistically representative value. The established background value for each parameter would be based on the mean value plus a statistically valid factor to account for spatial variability in the data in accordance with Ross TR Section 6.1.1.1 and LC 11.3(E) of SUA-1601 or the upper confidence-limit, as calculated using ProUCL.

The groundwater restoration program approved for the Ross ISR Project and proposed for the Proposed Action includes five processes:

1) Groundwater Sweep
2) Groundwater Transfer
3) RO Treatment with Permeate Injection
4) Groundwater Recirculation
5) Stability Monitoring

Groundwater Sweep

During groundwater sweep, water would be pumped from the recovery and injection wells to the Ross CPP without reinjection into the modules undergoing groundwater sweep.

A drawback of groundwater sweep is consumptive use of groundwater, since permeate is not reinjected into a module actively undergoing groundwater sweep. WDEQ/LQD has determined that groundwater sweep with direct disposal of produced water is not considered BPT due to excessive consumption of groundwater and resultant impacts to groundwater resources (LCI 2009). Strata would invoke the following strategy to minimize consumptive use of groundwater during groundwater sweep:

- Water produced during groundwater sweep will be treated by RO, avoiding any occurrence of groundwater sweep with direct disposal of produced water.

- Whenever possible, permeate generated from one module undergoing groundwater sweep would be reinjected into another module undergoing RO treatment with permeate reinjection.
- Much of the permeate discharged into the lined retention ponds at the Ross CPP would be recycled to the Ross CPP for make-up water.
- Groundwater sweep may be used selectively (e.g., around the perimeter of the module) rather than throughout the entire module to maximize benefits while minimizing consumptive use of groundwater.
- The total volume of water planned for groundwater sweep is much lower than that planned for RO treatment with permeate injection.
- Strata plans to employ the same groundwater model/reservoir engineering software platform used during the operation phase to guide aquifer restoration hydraulics and performance.

Groundwater Transfer

Groundwater transfer involves moving groundwater between one wellfield module entering restoration and another wellfield module entering production, or moving water between two areas within a single wellfield module that are in different stages of restoration (see ISR GEIS, pg. 2-27 through 2-28).

RO Treatment with Permeate Injection

During this phase of groundwater restoration, water would be pumped from one or more wellfield modules to the Ross CPP for treatment. Treatment would include uranium removal in IX columns and RO treatment to reduce dissolved constituents. Strata anticipates using two stages of RO treatment to maximize permeate production and minimize brine production. Additional treatment may include filtration to prevent fouling RO membranes, injection of antiscalant, pH control, and decarbonation. Permeate would be reinjected into the ore zone, while brine would be disposed of in the Ross ISR Project lined retention ponds and deep disposal wells. This phase of groundwater restoration would occur immediately following or in conjunction with groundwater sweep.

The influx of natural groundwater would be kept to a minimum by maximizing the quantity of permeate reinjected into modules undergoing RO treatment with permeate injection. This would be accomplished through the planned use of two separate phases of RO treatment, which would significantly reduce the amount of brine as compared to single-pass treatment.

Groundwater Recirculation

After completion of the RO with permeate injection phase, the groundwater recirculation phase would commence. In this phase, water from the ore zone would be pumped from recovery wells and recirculated into injection wells in the same module. This recirculation would homogenize water quality within the aquifer and help reduce the risk of "hot spots," or areas of unusually high concentrations of dissolved constituents. The only treatments that would occur during recirculation are filtration and uranium removal at the Ross CPP.

Stability Monitoring

Strata will initiate stability monitoring following restoration of a wellfield per LC 10.6 of SUA-1601 to ensure that chemical species of concern do not increase in concentration subsequent to restoration. Stability monitoring activities are described in Ross TR Section 6.1.2.5, are incorporated by reference, and summarized as follows.

The OZ wells used to define baseline water quality in each wellfield will be sampled eight times during a 12-month period per LC 10.6 of SUA-1601. This sampling frequency exceeds the minimum stability monitoring duration of 6 months specified in WDEQ/LQD Guideline 4. Stability monitoring will continue until the data show, for all parameters monitored, no statistically significant increasing trend, which would lead to an exceedance of the relevant standard in 10 CFR Part 40, Appendix A, Criterion 5B(5).

Stability monitoring samples will be analyzed for the constituents listed in approved Ross TR Table 5.7-2 as required by LC 10.6 of SUA-1601. Stability monitoring results will be evaluated to determine whether there are any significant trends in chemical species of concern.

Hot spots, or wells with elevated concentrations of dissolved constituents, will be identified using statistical analysis. If Strata identifies hot spots or increasing trends during stability monitoring, additional evaluation will be conducted to determine the potential for impact on the water quality outside of the exempted aquifer. Additional information is found in Ross TR Section 6.1.2.5.

The frequency of excursion monitoring would be reduced from twice monthly to quarterly during the stability monitoring phase, which is justified

on the basis that active groundwater restoration will be complete and no fluids will be injected into the affected wellfield module. The following methods of corrective action for an excursion occurring during the restoration stability monitoring period will be instituted (not necessarily in the order given), dependent upon circumstances. Procedures presented in Ross TR Section 5.7.8 describe the excursion response procedure, and are incorporated by reference, herein.

- A preliminary investigation will be completed to determine the probable cause and the area affected.
- Affected wells will be analyzed for the full suite of parameters in Ross TR Table 5.7-2.
- An assessment will be performed to determine what actions, if any, should be taken to protect the groundwater outside the exempted aquifer. If sufficient data to make such a determination are not available, additional wells may be installed to fill in data gaps.
- If the excursion may result in degradation of groundwater outside of the exempted aquifer, a pump back or pump and treat plan will be initiated to recover the excursion. The stability monitoring period will continue but will not be considered successful until the excursion is recovered or it can be demonstrated that the remnant of the excursion will not degrade the water quality outside the exempted aquifer.
- If the excursion will not result in degradation of groundwater outside the exempted aquifer, then the stability monitoring period may continue. At the end of the successful stability monitoring period the wells affected by an excursion will be analyzed for the parameters listed in Ross TR Table 5.7-2 to verify that groundwater outside the exempted aquifer will not be degraded.

During the groundwater restoration process, Strata will perform daily, weekly, and monthly analyses pursuant to Ross TR Section 6.1.3 to track restoration progress. These analyses will be summarized, along with the restoration methods, and discussed in the Semiannual Radiological Effluent and Environmental Monitoring Report submitted to NRC per LC 11.1(C) of SUA-1601. The analyses will also be submitted to WDEQ/LQD on a quarterly basis as required by Strata's WDEQ/LQD Permit to Mine No. 802. The final restoration report will include the results of all stability monitoring, statistical trend and hot spot analyses, and the results of any flow and transport

modeling to assess potential impacts outside of the exempted aquifer. The final restoration report will be submitted to NRC and WDEQ/LQD for regulatory approval. Following NRC and WDEQ/LQD approval, plugging and abandonment of wells and final reclamation will be performed pursuant to Ross TR Section 6.2.

5.4.2.2.1 Excursions

Excursions are defined in LC 11.5 of SUA-1601 as the exceedance of UCLs for two or more excursion indicators in a monitor well or any one excursion indicator parameter exceeding its UCL by 20 percent. To mitigate the potential for excursions Strata would construct a monitor well network within and around each wellfield module composed of perimeter wells and wells completed in the underlying and overlying aquifers in accordance with LC 11.3(B) and (C). The function of the monitor well network will be to detect any recovery solutions that may migrate away from the production area.

Prior to injection of lixiviant into a wellfield, Strata will establish excursion control parameters and their respective UCLs in the designated overlying and underlying aquifers and perimeter monitor wells in accordance with LC 11.4 of SUA-1601 and the procedures described in Section 5.7.8 of the KEA TR. Default excursion parameters for wells in the ore zone and overlying aquifer are chloride, conductivity, and total alkalinity. Default excursion parameters for wells in the underlying aquifer are sulfate, conductivity, and total alkalinity.

Water quality samples will be collected from monitor wells twice monthly and at least 10 days apart and analyzed for the excursion parameters. Water levels in monitor wells will also be measured in order to provide an early warning of a potential excursion and allow Strata to correct the wellfield imbalance before an actual excursion occurs. An increasing water level in a perimeter monitor well would indicate a flow imbalance locally within the wellfield, which could result in an excursion if not corrected. An increasing water level in an underlying or overlying monitor well would be indicative of the migration of fluid from the ore zone, possibly by an injection well casing failure. Strata's proposed monitor well network would allow corrective action to be taken immediately to locally balance the injection and recovery flows or for individual wells to be shut down as necessary.

To reduce the potential of an excursion due to an improperly abandoned exploration hole, Strata would locate and abandon all exploration drill holes that can be located within the perimeter monitor well ring in accordance with LC 10.12 of SUA-1601. Abandonment procedures are detailed in Addendum 2.6-E of the approved Ross TR. These holes would be reentered to total depth and sealed with cement slurry or high solids bentonite grout from the bottom to the ground surface as required by WDEQ/LQD.

In the event that an excursion is detected, Strata will adhere to the procedures in LC 11.5 of SUA-1601, which include verification sampling and reporting to NRC. Corrective actions would be implemented as described in Ross TR Section 5.7.8.2.

5.4.2.2.2 Spills and Leaks

Mitigation measures for accidental spills and leaks that could potentially affect groundwater are similar to those presented in Section 5.4.1.4 of this ER and are described below.

5.4.2.2.2.1 Wellfields, Booster Pump Stations, and Pipelines

Within the module buildings and booster pump stations, flow rates and pressures would be continuously monitored for any variations that could indicate a leak in the pipelines or wells. Instrumentation would be included to activate alarms and automatically shut down the pumping systems in the event of a flow or pressure reading outside of acceptable operating parameters. The module buildings, booster pump stations and valve vaults containing trunk lines and feeder line valves would be equipped with leak detection devices that would activate audible and visible alarms at the Ross CPP in the event of a leak. Wells would also undergo routine MIT to identify potential leakage per LC 10.5 of SUA-1601.

Piping used to convey solutions between the wells, module buildings, booster pump stations, and Ross CPP will be constructed of materials rated for an operating pressure which is greater than the proposed maximum injection pressure and the maximum anticipated recovery trunk line pressure. All piping would be pressure tested for leakage prior to operation. Construction specifications for buried pipelines would include pipe bedding to provide support and prevent rocks in trench backfill from damaging the pipes. Thrust

blocking would be provided at pipe bends and valves, and transient analysis would be performed to ensure that pipes are protected from rapid pressure changes resulting, for example, from the sudden closing of a valve or starting of a pump.

In the event that a significant piping failure causes a leak of injection or recovery fluids, the corresponding variation in flow or pressure would signal alarms in the module building, booster pump stations and/or Ross CPP. Automatic controls would stop operating equipment, and the operators would manually control equipment and valves to isolate and contain the leaking section of pipe. The equipment would be repaired and the leak cleaned up in accordance with Strata's Environmental Health and Safety (EHS) program and SOPs developed pursuant to LC 10.4 of SUA-1601.

5.5 Mitigation of Potential Ecological Resources Impacts

Primary impacts (areas of disturbance) would affect only approximately 13% of the proposed KEA and are associated with the construction of wellfields, booster pump stations, and associated infrastructure. Adverse effects to the evaluated species would consist primarily of potential disturbances or displacement of foraging individuals due to human and equipment disturbance and mortality or injury caused by vehicle or equipment collisions.

Given the limited number of vertebrate species of concern known or suspected to inhabit the area, the limited habitat disturbance associated with future ISR operations relative to the size of the proposed KEA, and Strata's commitments to honor important timing and spatial limitations and continue long-term monitoring, any such residual effects from the Proposed Action would likely occur only on a limited basis. Required reclamation would mitigate potential long-term impacts to wildlife species and habitats.

5.5.1 Vegetation

Potential impacts to vegetation associated with the proposed KEA are discussed in Section 4.5 of this ER. Mitigation measures to avoid or reduce potential vegetation impacts will consist of temporary and permanent surface revegetation of disturbed areas. Revegetation practices are described in Sections 5.1 and 5.3 of this ER and will be conducted in accordance with WDEQ/LQD regulations and the Reclamation Plan in Strata's WDEQ/LQD Permit to Mine No. 802. Disturbed areas will be seeded to re-establish a vegetative cover to minimize wind and water erosion and the invasion of undesired plant species. A temporary seed mix may be used in wellfields and other areas where the vegetation will be disturbed again prior to final decommissioning and final revegetation. The temporary seed mix typically consists of one or more of the native wheatgrasses. Permanent seeding would be accomplished with a seed mix approved by the WDEQ/LQD and the local landowners. Potential impacts to vegetation also would be mitigated by minimizing disturbance as described in Sections 5.1 and 5.3 of this ER.

5.5.2 Wildlife and Fisheries

Potential impacts to terrestrial species associated with the Proposed Action are discussed in Section 4.5 of this ER. The potential for impacts associated with ISR construction, operation, aquifer restoration, and decommissioning activities would be reduced by the relatively small area of surface disturbance, implementation of the mitigation measures described in Sections 5.1 and 5.3 of this ER (e.g., using existing roads where possible and minimizing secondary and tertiary access road widths).

Given the factors described above, and the limited use of the proposed KEA by most vertebrate species of concern, impacts to those species from the Proposed Action are expected to be minimal. Nevertheless, regulatory guidelines and requirements designed to prevent or reduce impacts to wildlife would include one or more of the following, as addressed by the various regulating and permitting agencies:

1) Completing sage-grouse monitoring and habitat protection (WGFD and USFWS);
2) Fencing designed to permit big game passage (WGFD);
3) Use of existing roads when possible, and location of newly constructed roads to access more than one drill site (BLM);
4) Implementation of speed limits to minimize collisions with wildlife, especially during the breeding season;
5) Adherence to timing and spatial restrictions within specified distances of active sage-grouse leks as required by the WGFD and WDEQ/LQD;
6) If direct impacts to raptors or migratory bird species of management concern result from ISR development and operations, a Monitoring and Mitigation Plan for those species must be prepared and approved by the USFWS, including one or more of the following provisions:
    a) Relocation of active and inactive raptor nests that would be impacted by drilling, construction, or operation activities in accordance with the approved raptor monitoring and mitigation plan;
    b) Creation of raptor nests and nesting habitat through enhancement efforts such as nest platforms to mitigate other nest sites impacted by ISR operations;
    c) Obtaining appropriate permits for all removal and mitigation activities;

d) Establishing buffer zones protecting raptor nests where necessary and restricting mine-related disturbances from encroaching within buffers around active raptor nests (from egg-laying until fledging) to prevent nest abandonment, or injury to eggs or young;
e) Reestablishing the ground cover necessary to attract and sustain a suitable raptor prey base after drilling, construction, and future uranium ISR; and
f) Required use of raptor-safe construction for overhead power lines according to current guidelines and recommendations issued by the Avian Power Line Interaction Committee (APLIC) in 2006 and/or USFWS;

7) Restoration of sagebrush and other shrubs on reclaimed lands and grading of reclamation to create swales and depressions for sagebrush obligates and their young (WDEQ/LQD);

8) Restoration of pre-drilling and pre-construction native habitats for species that nest and forage in those vegetative communities (WDEQ/LQD);

9) Restoration of diverse landforms, direct topsoil replacement, and the construction of brush piles, snags, and/or rock piles to enhance habitat for wildlife (WDEQ/LQD);

10) Restoration of habitat provided by jurisdictional wetlands (WDEQ/LQD, USACE); and

Another effective way to minimize potential impacts related to exploratory drilling in the proposed KEA would be the use of a systematic drilling pattern that affects only one area at a time, working from one side of the proposed KEA to another. Reclamation would be completed in the same sequence. This systematic approach would allow more mobile wildlife species to relocate into adjoining, undisturbed habitat and then return following completion of reclamation in a particular area. These efforts, in conjunction with the mitigation measures outlined above, would decrease direct and indirect impacts for all wildlife species.

5.6 Mitigation of Potential Air Quality Impacts

Potential impacts to air quality during all phases of the Proposed Action (Section 4.6 of this ER) include the generation of non-radiological and radiological airborne emissions. Non-radiological emissions include fugitive dust and combustion emissions. Radiological emissions will be limited to radon gas released in small quantities from the wellfield.

Control of fugitive dust will be regulated through the MOU between Strata and Crook County and Strata's air quality permit (No. CT-12198) for the Ross ISR Project, both of which will be modified as necessary to include the proposed KEA. Currently, both the MOU and the air quality permit require Strata to use dust suppression on roads associated with the Ross ISR Project.

In addition to the air quality permit and MOU, Strata will implement additional air quality protection measures including the following:

- Reducing fugitive dust by implementing speed limits within the proposed KEA and selecting road surface materials that will minimize fugitive dust
- Reducing the potential for release of fugitive dust from construction activities by suppressing dust in disturbed areas with water
- Restoring and re-seeding disturbed areas promptly, typically within one construction season

5.7 Mitigation of Potential Noise Impacts

As a result of the remote location of the proposed KEA and the low population density of the surrounding area, noise impacts are expected to be small. As discussed in Section 4.7 of this ER, the Proposed Action will extend the duration and expand the area of the potential noise impacts evaluated for the Ross ISR Project. To mitigate traffic noise, Strata will set a speed limit of 15 mph on all access roads within the proposed KEA. Posted signs will be located throughout the proposed KEA to ensure all employees and contractors are aware of speed limits. Strata will also implement a policy that will include adherence to county road speed limits for all Strata employees and contract workers.

Noise originating from the drilling equipment would be apparent locally. Most of the nearby residents would have minimal effects from daytime drilling; however, people generally have a lower tolerance to noise at night. The nearest residence is 475 feet from the proposed KEA. As shown in Table 4.7-1 of this ER, the anticipated noise level resulting from a drill rig at this distance is 23 to 45 dBA. Most drilling activities will take place well inside the proposed KEA boundary, and therefore the noise levels from drilling activities are anticipated to be well below the annoyance threshold (55 dBA) described in Sections 3.7 of this ER. Nevertheless, Strata will coordinate drilling activities to minimize noise disturbance. Recognizing that the tolerance for noise typically decreases at night, Strata will restrict drilling to daytime hours (6 a.m. to 8 p.m.) in areas where the annoyance noise threshold could be exceeded at nearby residences.

Most of the heavy equipment will be used during the construction phase of the project. For safety, the majority of construction equipment will only be run during daylight hours. This should increase the tolerance of residents to noise from construction equipment. Strata will also limit noise impacts in sensitive areas by limiting use of equipment with loud engines, unrestricted exhaust systems, and engine brakes.

The National Institute for Occupational Safety and Health (NIOSH) recommends an exposure limit for workplace noise of 85 dBA for a duration of 8 hours per day. Several types of construction equipment such as bulldozers, excavators, and front-end loaders can reach noise levels well above 85 dBA. Strata will implement a hearing conservation program to ensure that proper PPE is worn and engineering controls are in place to protect workers from

potentially damaging noise. The hearing conservation program will be designed in accordance with OSHA standards in 29 CFR § 1910.95. Specific elements of the program will include:

- Workplace noise sampling;
- Informing workers of noise exposure;
- Providing workers opportunity to observe noise measurements;
- Maintaining a worker audiometric testing program;
- Implementing comprehensive hearing protection follow-up procedures;
- Proper selection of hearing protection;
- Evaluating hearing protectors' attenuation and effectiveness;
- Training to ensure workers are aware of the hazards; and
- Data management.

5.8 Mitigation of Potential Historic and Cultural Resources Impacts

The NRC will address the potential impacts to historic properties, associated with the proposed KEA, under the process set out in the regulations at 36 CFR § 800.8 (Advisory Council on Historic Preservation or ACHP). In accomplishing that, NRC will identify and coordinate with consulting parties, including the ACHP, the Wyoming State Historic Preservation Officer (SHPO), and tribes that may attach religious and cultural significance to historic properties that may be impacted by the proposed KEA as early as possible in the NEPA process. The NRC will notify these parties as to their intent to address the potential impacts of the undertaking on properties listed in or eligible for listing in the NRHP under the regulations set out as noted above. The following section details the methods and actions necessary to coordinate completion of the NEPA action and a Finding of No Significant Impact (FONSI) under NEPA, with the requirements of Section 106.

Class I and III inventories to identify any known or potential historic properties have been conducted within the entire area of the proposed KEA as described in Section 3.8.2 of this ER. The results are included as Addendum 3.8-A. The Class III inventory report includes information that falls under the confidentiality requirement in Section 304 of the NHPA (16 U.S.C. 470w-3(a)). Potential impacts to historic properties are described in Section 4.8.1 of this ER. Some properties identified in the Class III inventory remain unevaluated for listing in the NRHP pending any needed, further studies such as archaeological testing. No tribal surveys for identification of potential Traditional Cultural Properties (TCPs) have been completed to-date.

Prior to any ISR-related disturbance, NRC will consult with the SHPO and Strata on evaluation of the NRHP eligibility of the potential historic properties identified during the Class III inventory for which additional testing is not recommended and on potential measures to avoid any direct impacts by such actions as any ground disturbances. If any properties (evaluated for NRHP eligibility or not) can be avoided then measures would be established to do so and included in the draft and final NEPA analysis. If eligible properties cannot be avoided, Strata will sponsor sufficient testing at archaeological properties in order to provide the information necessary for determinations of eligibility. If the NRC and the SHPO cannot come to consensus on the eligibility of such properties, NRC would seek the opinion of the Keeper of the

NHRP and the Keeper's decision would be final. Testing on archaeological properties would also be designed to plan for potential data recovery studies to mitigate the unavoidable impacts identified on any properties determined eligible for listing. Those plans would be developed in consultations among Strata, NRC staff and SHPO. Any mitigation plan for archaeological properties would include appropriate curation of any cultural materials and other data recovered in mitigation studies when the land owner gives permission for curation of cultural materials. If land owners do not give permission for curation of cultural materials, then all other data from the work would be submitted for curation. Table 3.8-1 of this ER lists the current NRHP-eligibility recommendation of the 49 properties identified within the proposed KEA.

NRC staff will initiate nation-to-nation consultations with tribes which may attach religious or cultural significance to properties. If the tribes so choose, Strata will assist them in carrying out on-site tribal inventories for such properties, wherever surface owners give permission for such inventories. Identification of TCP and NRHP eligibility evaluations of them will depend upon the data provided in the tribal inventory report(s) sent to the NRC by the tribes and apply the system set-out in *National Register Bulletin 38*. Tribal inventory data would include the forms required by the SHPO. NRC staff would then consult with the SHPO on the potential eligibility of any proposed TCP for NRHP listing. Strata would be provided the tribal inventory report(s), with strict confidentiality provisions to address Section 304 of the NHPA. If NRC staff and SHPO cannot come to consensus on eligibility within 30 working days, they will consult to resolve outstanding issues within another 25 working days. If additional consultations do not resolve the evaluations, then all of the data on potential TCP(s) would be submitted to the Keeper of the National Register, prepared in the format required by the Keeper, for a final decision on eligibility. Strata, NRC staff, SHPO and tribes which may attach religious or cultural significance to TCP(s) found eligible for listing, will then consult to identify measures to avoid, minimize or mitigate any impacts that could occur as a result of the development of the proposed KEA.

In addition, general measures to avoid, minimize or mitigate potential impacts (direct and indirect) to historic properties may include the following:

- avoidance in development of the proposed KEA, where practical, of potentially eligible historic properties;

- archaeological data recovery to mitigate the unavoidable impacts to archaeological properties found eligible under NRHP Criterion D;
- adherence to LC 9.8 of SUA-1601, which includes a cease work provision should an unanticipated discovery of potential historic properties occur;
- adherence to the training and discovery clauses included in the *Unanticipated Discovery Plan* (UDP);
- conducting pre-construction meetings to ensure that all Strata employees and contractors are fully aware of the measures specified to avoid, minimize or mitigate impacts to historic properties and in the event of unanticipated discoveries;
- minimizing short-term visual impacts by phasing wellfield construction, restoring and re-seeding disturbed areas promptly, using neutral colors for the module buildings, booster pump stations and wellhead covers, along with using dust suppression and
- minimizing long-term visual impacts by reclaiming and restoring the land surface to pre-existing condition and uses during decommissioning.

No paleontological material (fossilized vertebrate remains) beyond small macroscopic fragments were located within the proposed KEA, as discussed in this Section 3.8 of this ER. However, the Lance Formation has a high potential to yield vertebrate fossils, therefore the UDP includes provisions for training field personnel in the identification of vertebrate fossils, ceasing work as appropriate should a discovery be made, and reporting any discoveries.

NRC staff will implement the process for submission, reviews and any necessary revisions to the final NEPA document and the FONSI to address potential impacts to historic properties, as set out under 36 CFR 800.8 (2). The final NEPA document and FONSI may also include provisions that actions to address potential impacts may be phased to reflect the consideration of project alternatives and proposed future actions associated with the proposed KEA, with an effort that is commensurate with the assessment of other environmental factors.

5.9 Mitigation of Potential Visual and Scenic Resources Impacts

Potential impacts to the visual and scenic resources of the proposed KEA are discussed in Section 4.9 of this ER. Strata will implement mitigation measures to reduce the visual effects of the wellfields, access roads, and drill rigs during the construction, operation, aquifer restoration and decommissioning phases. Mitigation measures for potential visual and scenic impacts at the proposed KEA are the same as were approved for the Ross ISR Project.

Well head covers will be approximately 3 feet tall. Since livestock grazing will be restricted in these areas, vegetation will help conceal the well head covers. Strata will choose a neutral color for the well head covers to further screen the locations. When aquifer restoration is complete and regulatory approval is granted in specific wellfield modules, Strata will reclaim and re-seed those areas. This will help reduce the industrial look of the area.

Access roads constructed within the proposed KEA will include secondary access roads to the wellfield module buildings and booster pump stations. Roads will be aligned with the terrain and will be constructed to avoid a straight-line appearance. Although aligning the roads with topography may add slightly more disturbance, it will reduce the amount of large cuts and fills.

Construction equipment will be on site temporarily; however, drill rigs will be in operation during the construction and operations phases of the project. To reduce the visual impacts, Strata will minimize the amount of nighttime drilling. For the safety of the employees, large lights will be needed during nighttime drilling. To reduce the brightness of the lights, Strata will turn them away from any nearby residences. As discussed in Section 5.7 of this ER, Strata will restrict the proximity of operating drill rigs to any residences at night to control potential noise impacts.

As described in Section 4.9 of this ER, Strata will conduct baseline monitoring for potential light pollution for the Ross ISR Project. The results of the pre-construction baseline evaluation will be used to prepare a light pollution operational monitoring plan, which would be modified to include the proposed KEA.

Dust will likely be generated during construction activities and from truck traffic on county and local roads. As described in Section 5.6 of this ER,

Strata will utilize dust suppression, enforce speed limits, and promptly revegetate disturbed areas to minimize potential dust impacts.

5.10 Mitigation of Potential Public and Occupational Health Impacts

Strata will minimize potential impacts to public and occupational health by complying with the Radiation Protection Standards contained in 10 CFR Part 20 and following the ALARA principle. In addition, prior to the pre-operational inspection of the Ross ISR Project, Strata will prepare, and make available for NRC staff inspection, a Health and Safety Plan (HASP) including SOPs and a Radiation Protection Manual (RPM). The content of each of these documents is summarized in the response to ER RAI P&O Health-2(A) (Strata 2012). The HASP will apply to the Proposed Action and will be modified, if needed, to accommodate the proposed KEA.

As discussed in Section 3.10 of this ER, the proposed KEA is located in a sparsely populated area of western Crook County, Wyoming. The nearest community is Moorcroft, Wyoming (2010 population 1,009), about 16 miles to the south. The closest urban area to the proposed KEA is Gillette, Wyoming (2010 population 29,087), about 40 road miles to the southwest. The population distribution for the 50-mile radius around the proposed KEA is depicted in Figure 3.10-1 of this ER. Section 3.1.5 of this ER describes nearby residences. There are no residences within the proposed KEA. Within 2 miles, there are 16 residences with approximately 32 current residents. The nearest residence to the proposed KEA is about 475 feet away.

5.10.1 Mitigation of Potential Construction Impacts

During the construction phase of the Proposed Action, potential impacts to public and occupational health include: fugitive dust, combustion emissions, noise, and occupational hazards associated with construction of the wellfield, module buildings, booster pump stations, and associated facilities. Potential impacts from fugitive dust and combustion emissions are described in Section 4.6 of this ER. As described in the ISR GEIS (pg. 4.2-53), fugitive dust would not likely result in any significant radiological dose as long as soils show low levels of radionuclides. Impacts from fugitive dust will be mitigated by limiting the area subject to disturbance at any given time and seeding disturbed areas promptly after construction, typically within a single construction season.

Section 4.7 of this ER addresses potential noise levels associated with construction equipment. Members of the public will not be exposed to

potentially damaging noise levels, and a hearing conservation program for Strata employees and contractors will mitigate effects of occupational noise during construction. Other potential occupational hazards will be those typical of construction and drilling and will generally be the same as occupational hazards to existing oilfield workers. These include occupational injuries such as strains and sprains resulting from common incidents such as slips/trips/falls or lifting. Potential occupational injuries will be mitigated by implementing worker safety procedures and training programs that conform to the Wyoming Occupational Health and Safety Act, Title 27, Labor and Employment, Chapter 11, Occupational Health and Safety and applicable OSHA standards.

5.10.2 Mitigation of Potential Operation Impacts

As discussed in Section 4.12.1.2 of this ER, operations under the Proposed Action have the potential for radiological and non-radiological impacts to public and occupational health. The potential for radiological and non-radiological impacts include those typical of normal operation and those associated with accidents.

Potential non-radiological public and occupational health impacts will be related to fugitive dust, combustion emissions, noise, and contamination of water supplies. Section 4.12 of this ER includes descriptions of these potential impacts based on the potential pathways of exposure. The receptors for non-radiological impacts include nearby residences, public schools and drinking water intakes.

Potential impacts from fugitive dust emissions will be mitigated by implementing dust control BMPs, limiting areas that are disturbed and unreclaimed at any given time, and reclaiming disturbed areas at the first opportunity.

Section 4.12.1.2.2 of this ER describes the potential for non-radiological impacts from accidents during operation at the proposed KEA. Accidents involving human safety associated with uranium ISR typically have far less severe consequences than accidents associated with underground and open-pit mining methods. Accidents that may occur in ISR operations are generally minor when compared to accidents that typically occur in other industries. Radiological accidents that might occur would typically manifest themselves

slowly and therefore would be easily detected and mitigated. The remote location of the proposed KEA and the low level of radioactivity associated with the process combine to decrease the potential hazard of an accident to the general public.

Strata will mitigate the potential impacts of accidents by implementing and enforcing emergency management procedures following the recommendations contained in the NRC analyses in NUREG-0706 and NUREG/CR-6733 and in accordance with LC 10.4 of SUA-1601. Training programs, discussed in Chapter 5 of the Ross and KEA TR's, will ensure that Strata personnel are adequately trained to respond to all potential emergencies.

To mitigate hazards associated with storage and handling of oxygen, if stored near the proposed KEA wellfield module buildings, Strata will design and install underground gaseous oxygen piping in accordance with industry standards contained in CGA G4.4 concerning material specifications, velocity restrictions, location and specifications for valves, and design specifications for metering stations and filters. To mitigate the risk of an accident that could potentially affect other processes or storage facilities and radiological safety, oxygen will be stored an appropriate distance from other infrastructure and storage areas in facilities that conform to standards detailed in NFPA 55. Strata will develop procedures that implement emergency response instructions for an accident involving oxygen systems pursuant to LC 12.11 of SUA-1601.

Strata completed an assessment of the radiological effects for the Ross ISR Project based on the types of emissions, potential pathways, and potential consequences of radiological emissions (see Ross ER Section 4.12). The following discusses mitigation of potential radiological impacts for each pathway; additional details are found in Section 7.3 of the Ross and KEA TR's.

To reduce and mitigate potential exposures from water pathways, Strata will control and monitor the solutions in the ore zone to ensure that migration does not occur. This will include maintaining a net inward hydraulic gradient in ISR wellfields as required by LC 10.7 of SUA-1601 and monitoring the overlying, underlying, and adjacent non-exempt aquifers for potential excursions per LC 11.5 of SUA-1601.

Radon gas emissions from wellfields will be the only radiological airborne effluent. Radon gas released from well heads, module buildings and booster

pump stations will have minimal impact on the public and workers since radon does not pose an outdoor health hazard.

Ross TR Section 5.7 described the radiation safety controls and monitoring programs that will be implemented at the Ross ISR Project. These programs will also be implemented at the proposed KEA, as applicable. Details of potential credible accidents specific to the booster pump stations within the proposed KEA are discussed in Section 7.5 of the KEA TR.

The rupture of an injection or recovery line in a wellfield module, or a trunk line between a wellfield module and the Ross CPP, would result in a release of injection or recovery solution, which would contaminate the ground in the area of the break. Occasionally, leaks at pipe joints and fittings in the module buildings, booster pump stations, or at the wellheads may occur. These leaks would seldom result in soil contamination due to the secondary containment systems proposed for the facilities. To mitigate any adverse effects, following repair of a leak, Strata will require that the affected soil be surveyed for contamination and the area of the spill documented. If contamination is detected, the soil will be sampled and analyzed for the appropriate radionuclides and any contamination would be removed as appropriate. Spills meeting the criteria in 10 CFR Part 20 Subpart M and 10 CFR 40.60 will be reported to the NRC per LC 11.6 of SUA-1601.

To mitigate the effects of any potential transportation accidents, extensive emergency response programs will be in place along with environmental emergency response contractors for spill cleanup. Strata will coordinate critical emergency response requirements within local authorities, fire department, medical facilities, and other emergency services per LC 12.2 of SUA-1601. The emergency response program will address specific SOPs and employee training requirements for each phase of operation. The emergency response program will be reviewed by Strata's Safety and Environmental Review Panel (SERP) and be available for NRC inspection at the pre-operational inspection of the Ross ISR Project. Specific provisions of the emergency response program will include but will not be limited to:

- Training requirements, designated employees and responsibilities for an in-house emergency response team.
- An Incident Command System (ICS) to be used for managing an incident of any size. The ICS will include coordination procedures with

local fire departments, local emergency response personnel, law enforcement and regional Hazmat teams to allow the site personnel to easily be integrated into the mutual aid response team.

- A fire safety program that will include written procedures for fire prevention, emergency response instructions for fire involving oxygen or other chemical systems, and coordinating fire suppression planning with the Crook County Fire Warden and Fire Zone Warden (Crook County MOU, provision A(xiii)).
- Demonstration of compliance with the Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986 regarding emergency planning and community right-to-know reporting on hazardous and toxic chemicals. The EPCRA program will include written procedures to coordinate emergency management and hazardous materials management with the Crook County Homeland Security Director (Crook County MOU, provision A(xii)).
- A written program addressing preparedness and emergency response procedures for potential natural disasters including tornados, earthquakes, flooding, power outages, and wildfires.

Solid 11e.(2) byproduct material or unusable contaminated equipment generated during operations and decommissioning will be transported to a licensed disposal site, as required by LC 9.9 of SUA-1601. Potential radiological and environmental impacts in the case of an accident will be small due to the low level of radioactive concentration in the shipments. To mitigate any adverse effects, the solid material would be collected and contained in the event of an accident. Should a transportation accident result in the release of 11e.(2) byproduct material, Strata will provide a post clean-up radiological survey of the affected area to verify that all contaminants have been removed.

5.10.3 Mitigation of Potential Aquifer Restoration Impacts

Aquifer restoration activities will have similar but smaller potential impacts to public and occupational health than operation activities. The same mitigation measures described previously for the operation phase will be used to avoid or reduce potential public and occupational health impacts during aquifer restoration.

5.10.4 Mitigation of Potential Decommissioning Impacts

Potential public and occupational health impacts during decommissioning would be similar to those during construction. There will be similar types of occupational hazards such as equipment operation, and there will be an increase in the workforce, although the total number of employees and contractors will be within the workforce estimated for the Ross ISR Project. Strata will be required to submit a decommissioning plan for NRC review per LC 10.3 of SUA-1601 at least 12 months prior to initiation of decommissioning activities. The plan will include details on the implementation of a 10 CFR Part 20 compliant radiation safety program. The safety program will ensure that the safety of the workers and public is maintained and that any residual impacts are mitigated during decommissioning.

5.11 Mitigation of Potential Waste Management Impacts

Section 4.13 of this ER describes how the anticipated quantities, proposed waste management systems, and potential impacts resulting from the management of liquid and solid waste generated under the Proposed Action will be similar to or less than those described in the approved Ross ER. As described in Sections 2.1.2.2.5 and 4.13.1 of this ER, the major sources of AEA-regulated liquid waste generated from the Proposed Action will include wastewater from injection and recovery well work over and enhancement operations in the wellfields and from spills and leaks. Non-AEA-regulated liquid waste will include TENORM (technologically enhanced naturally occurring radioactive materials) and storm water runoff. AEA-regulated solid waste will include scale and sludge from equipment maintenance, contaminated soil, contaminated solids from ISR wells, contaminated PPE, and contaminated materials and equipment from decommissioning that cannot be decontaminated to approved levels. Non-AEA-regulated solid waste will include construction debris, solid hazardous waste, and decontaminated material and equipment.

This section describes measures that will be taken by Strata to mitigate any adverse waste management impacts that might result from the Proposed Action.

Solid 11e.(2) byproduct material will be generated during all project phases except construction. The 11e.(2) byproduct material will be transported by an appropriately licensed transporter to a disposal facility licensed by NRC or an agreement state in accordance with LC 9.9 of SUA-1601. Potential impacts resulting from the management and disposal of 11e.(2) byproduct material include potential spills, addressed in Section 4.4 of this ER, and potential transportation impacts, addressed in Section 4.2 of this ER.

The primary method of mitigating any potential impacts from disposal of 11e.(2) byproduct material will be to minimize the amount of this material through process design, decontamination, and volume reduction during decommissioning. Where possible, equipment will be decontaminated and reclassified as non-hazardous material for unrestricted release. Decontamination procedures are discussed in Ross TR Section 6.3 and may include high pressure washing, sand blasting, and acid rinsing. Strata

anticipates that a grinder or chipper will be used to reduce disposal volumes of piping and other materials by 50% or more.

Non-AEA-regulated solid waste will include construction debris and decontaminated material and equipment. Non-AEA-regulated solid waste will be generated during all project phases, including construction, operation, aquifer restoration, and decommissioning. Most of the solid waste will be generated during decommissioning as described in Section 4.13 of this ER.

Non-hazardous solid waste will be disposed off-site in a municipal landfill permitted by WDEQ/SHWD. The nearest municipal landfills include Moorcroft (approximately 23 road miles south) and Gillette (approximately 50 road miles southwest). Some solid waste materials may be disposed on site to reduce impacts on local landfills if approved by the WDEQ/SHWD.

Significant quantities of construction debris could be generated during decommissioning. Construction/demolition waste will be transported to a municipal landfill for disposal in a designated containment system or disposed on-site in a WDEQ/SHWD-approved facility on Strata-owned surface.

Quantity estimates and management plans for TENORM are described in Section 4.13.1.1.2.2 of this ER. Mud pits containing drilling fluids and cuttings will be backfilled and graded in accordance with WDEQ/LQD regulations. It is expected that TENORM groundwater generated during the operation and decommissioning phases will be discharged under a temporary WYPDES permit as long as the well is not completed in an interval which could have been affected by uranium recovery operations. Mitigation measures for WYPDES discharge are discussed in Section 5.4.1 of this ER and include erosion control BMPs and energy dissipation devices. To mitigate any impacts from these disposal methods, the quantity of drilling fluids will be minimized by using the minimum quantity of water that is technically feasible for well drilling and development. Other mitigation measures that will minimize potential impacts from TENORM waste disposal include backfilling, restoring and re-seeding mud pits, typically within a single construction season, using sediment control BMPs, avoiding construction in areas with previously identified, potentially NRHP-eligible cultural sites, and stopping work if any previously undiscovered cultural resources are encountered during construction or reclamation of mud pits. Mud pits will be included in the

decommissioning gamma surveys to ensure that there are no potential long-term impacts from radioactivity in mud pits.

5.12 References

LCI (Lost Creek ISR, LLC), 2009, 3rd Round WDEQ/LQD Comment Responses, October 22, 2009. NRC ADAMS Accession No. ML100610158.

NRC, 2014, Staff's Response to Strata Energy's Letters Dated July 16, 2014, and Comment on Distance to Perimeter Well Ring, November 13, 2014. NRC Adams Accession No. ML14301A434.

Strata, 2012, RAI Question and Answer Responses Environmental Report for the Ross ISR Project. March 2012. NRC Adams Accession No. ML121030465.

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6.0 ENVIRONMENTAL MEASUREMENT AND MONITORING PROGRAMS

This section describes Strata's environmental measurement and monitoring programs for the proposed KEA. Monitoring methods discussed, herein, are currently approved by the NRC staff for the licensed Ross ISR Project, to which the proposed KEA is being amended. Approved programs include radiological monitoring, physiochemical monitoring, ecological monitoring, and historic and cultural resources monitoring programs. These monitoring programs will be used to measure and address the potential impacts addressed in Chapter 4 and the mitigation measures described in Chapter 5. These efforts will ensure the protection of worker health and safety as well as the protection of the public and environment.

6.1 Radiological Monitoring

This section describes Strata's proposed radiological monitoring program specific to the proposed KEA. The purpose of the program is to ensure the health and safety of the public and workers by characterizing and evaluating the radiological environment and identifying principal radiation pathways. This operational radiological monitoring program is based on the recommendations of NRC Regulatory Guides 4.14 (NRC 1980), 4.15 (NRC 2007) and 8.37 (NRC 1993) to meet the requirements of 10 CFR Part 20 and 10 CFR Part 40. Additionally, all monitoring will be conducted in accordance with approved scientific protocols and guidance, which have been incorporated into SOPs. A summary of the major elements of the radiological program is presented in Table 6.1-1.

6.1.1 Radiation Monitoring

6.1.1.1 Ambient Monitoring

The operational airborne radiation monitoring program will utilize the air particulate sites established for the pre-operational baseline monitoring program, discussed in Section 3.11.4.2.4 of this ER. Baseline monitoring and MILDOS-AREA modeling confirmed that the monitoring locations, depicted in Figure 3.11-30 of the KEA TR, are consistent with Regulatory Guide 8.30. Additionally, the monitoring stations meet the recommendations of Regulatory Guide 4.14, which states that:

> "Air particulate samples should be collected at (1) a minimum of three locations at or near the site boundary, (2) the residence or occupiable structure within 10 kilometers of the site with the highest predicted airborne radionuclide concentration, (3) at least one residence or occupiable structure where predicted doses exceed 5 percent of the standards in 40 CFR Part 190, and (4) a remote location representing background conditions."

Strata will anticipate using F&J Specialty Products samplers. Filters will be collected from each air-sampling unit on a weekly basis (or more often as required by dust loading) and analyzed for uranium, radium-226, thorium-230 and lead-210.

Strata will co-locate radon detectors and optically stimulated luminescence (OSL) dosimeters with the air particulate samplers and

additional locations across the proposed KEA. Strata anticipates using LANDAUER high-sensitivity environmental radon Radtrak detectors and InLight OSL dosimeters. The results will be used to assess quarterly radon concentrations and gamma exposure rates at each of the sites.

6.1.2 Soils and Sediment Monitoring

During operations, Strata will conduct soil and sediment sampling on an annual basis. Soil samples will be collected at the air particulate stations, while sediment samples will be collected at the surface water monitoring stations, grab sample sites, and reservoirs within the proposed KEA with the potential to be impacted by drainage from proposed wellfields (see Figure 6.1-1). Sediment sample collection will be initiated in the quarter that uranium production begins in the drainage of the sampling site. All soil samples will be collected to a depth of 5centimeters. Following the recommendations of Regulatory Guide 4.14, the samples will be analyzed for total uranium, radium-226, and lead-210. In addition, sediment samples will be analyzed for thorium-230.

6.1.3 Water Resource Monitoring

Strata will employ a detailed water sampling program during operations to identify any potential impacts to water resources of the area. The operational water monitoring program will include evaluation of groundwater on a regional basis, groundwater within the proposed KEA, and surface water on a regional and site-specific basis. The following presents the radiological monitoring component of the program, while Section 6.2 of this ER describes the physiochemical monitoring including monitoring for excursions and during aquifer restoration.

6.1.3.1 Surface Water Monitoring

During operations, Strata will monitor the surface water features that could be potentially impacted either due to a spill or leak. Operational monitoring sites will potentially consist of the 3 Ross surface water monitoring stations (SW-1, SW-2 and SW-3), 6 grab station sites, and 13 reservoirs within the KEA with potential to be impacted by a release to the surface. Figure 6.1-1 depicts locations of the potential operational surface water monitoring sites. Surface water monitoring will be initiated in the quarter that uranium production begins in the drainage of the sampling site(s) and will continue on a

quarterly basis. Samples will be analyzed for dissolved and suspended uranium, radium-226, thorium-230 and lead-210. Additionally, the surface water stations will be equipped with pump samplers from April through October. The samplers will continuously monitor flow rates and automatically collect a sample in the event of significant runoff.

6.1.3.2 Groundwater Monitoring

Strata will conduct monitoring of existing water supply wells as part of the operational monitoring program. Existing water supply well sampling will include wells within 1.2 miles of the perimeter ring monitor wells for all wellfields undergoing recovery operations or aquifer restoration in accordance with LC 11.1(D) of SUA-1601. Figure 6.1-2 depicts the locations of existing water supply wells which will potentially be monitored over the lifetime of the proposed KEA. Section 3.4.3 of this ER provides a summary of the existing water supply wells sampled during pre-licensing site characterization baseline monitoring. The existing water supply wells will be monitored quarterly with consent of the landowner. Samples will be analyzed for dissolved uranium and radium-226 with results reported to landowners and in the semi-annual report to NRC staff required by LC 11.1(D) of SUA-1601.

Table 6.1-1. Summary of the Major Elements of the Proposed KEA Operational Environmental Monitoring Program

Program Element	Location	Radionuclides Analyzed	Sampling Frequency	Number of Sampling Locations
Groundwater – Existing Water Supply Wells	Existing water supply wells within 1.2 miles of the perimeter ring monitoring wells (LC 11.1(D) of SUA-1601)	Dissolved uranium, Ra-226,	Quarterly	To be determined as uranium production is initiated in specific mine units
Surface Water	Surface waters passing through proposed KEA and reservoirs subject to runoff	Dissolved and suspended uranium, Ra-226 Th-230, Pb-210	Quarterly (as available)	Following uranium production in the potentially impacted drainage at 3 surface water monitoring stations, 6 grab sample sites and 13 reservoirs
Particulates in Air(1)	Locations with the highest predicted concentrations, nearest residences and control location similar to pre-operational baseline monitoring	Total uranium, Th-230, Ra-226, Pb-210	Continuous-composites of weekly filters analyzed quarterly	5 or more
Radon in Air	Particulate in air locations and other areas of interest similar to pre-operational baseline monitoring	Rn-222	Continuous via Radtrak units – quarterly exchange and analysis of units	5 or more
Soil	Particulate in air locations	Total uranium, Ra-226, Pb-210	Annually	5 or more
Sediment	Surface waters passing through proposed KEA and reservoirs subject to runoff	Total uranium, Ra-226, Pb-210, Th-230	Annually (as available)	Following uranium production in the potentially impacted drainage at 3 surface water monitoring stations, 6 grab sample sites and 13 reservoirs
Direct Radiation	Particulate in air locations and other areas of interest	Continuous via OSL dosimetry	Quarterly	5 or more

(1) Location of air particulate samplers used during the pre-operational baseline monitoring will be re-evaluated for operational monitoring based on results of the pre-operational meteorological monitoring program (Section 3.5 of this ER) and the results of the MILDOS-AREA analysis (KEA TR Section 7.3) to insure at least 3 locations are selected representing 3 different sectors that have the highest predicted concentrations of radionuclides

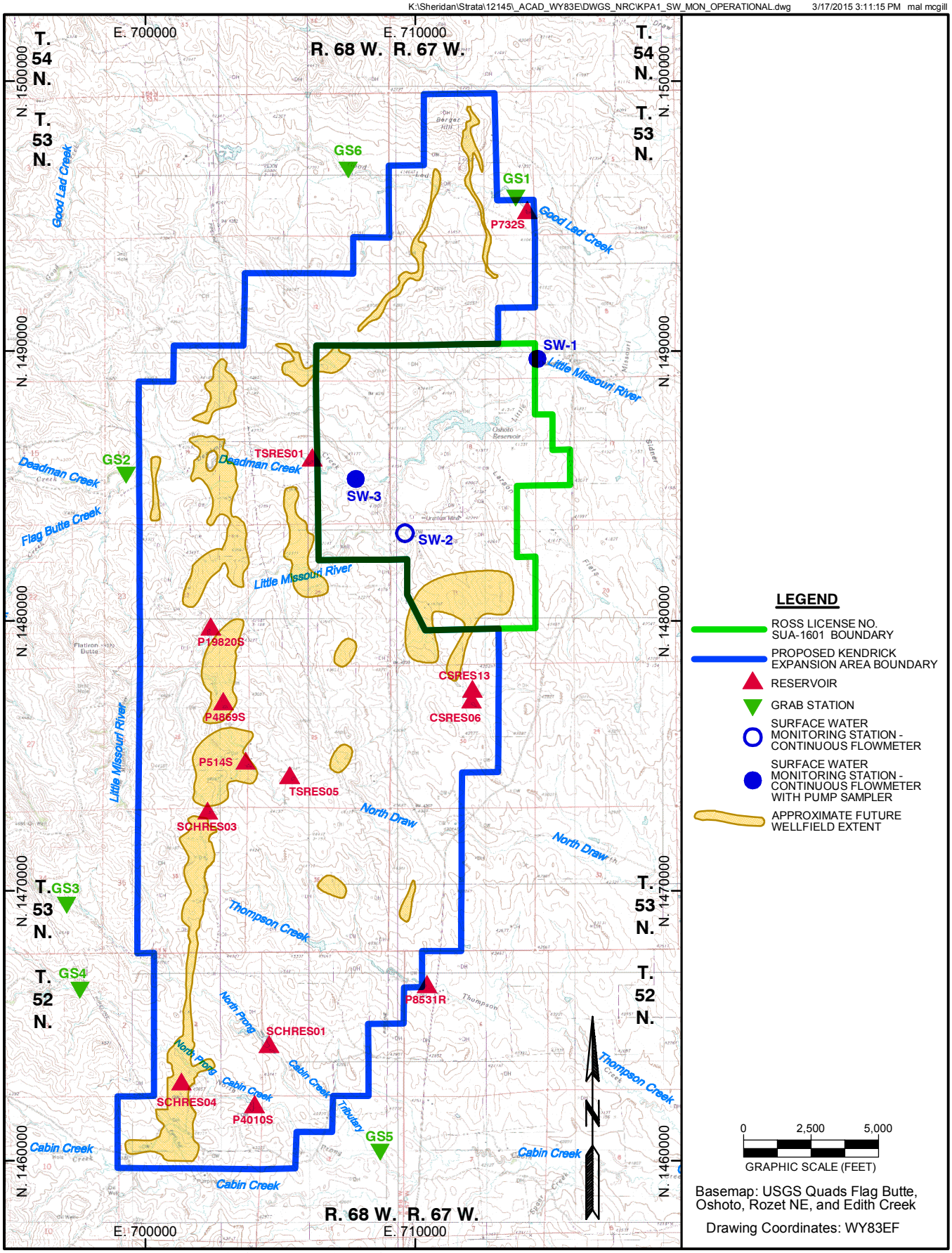
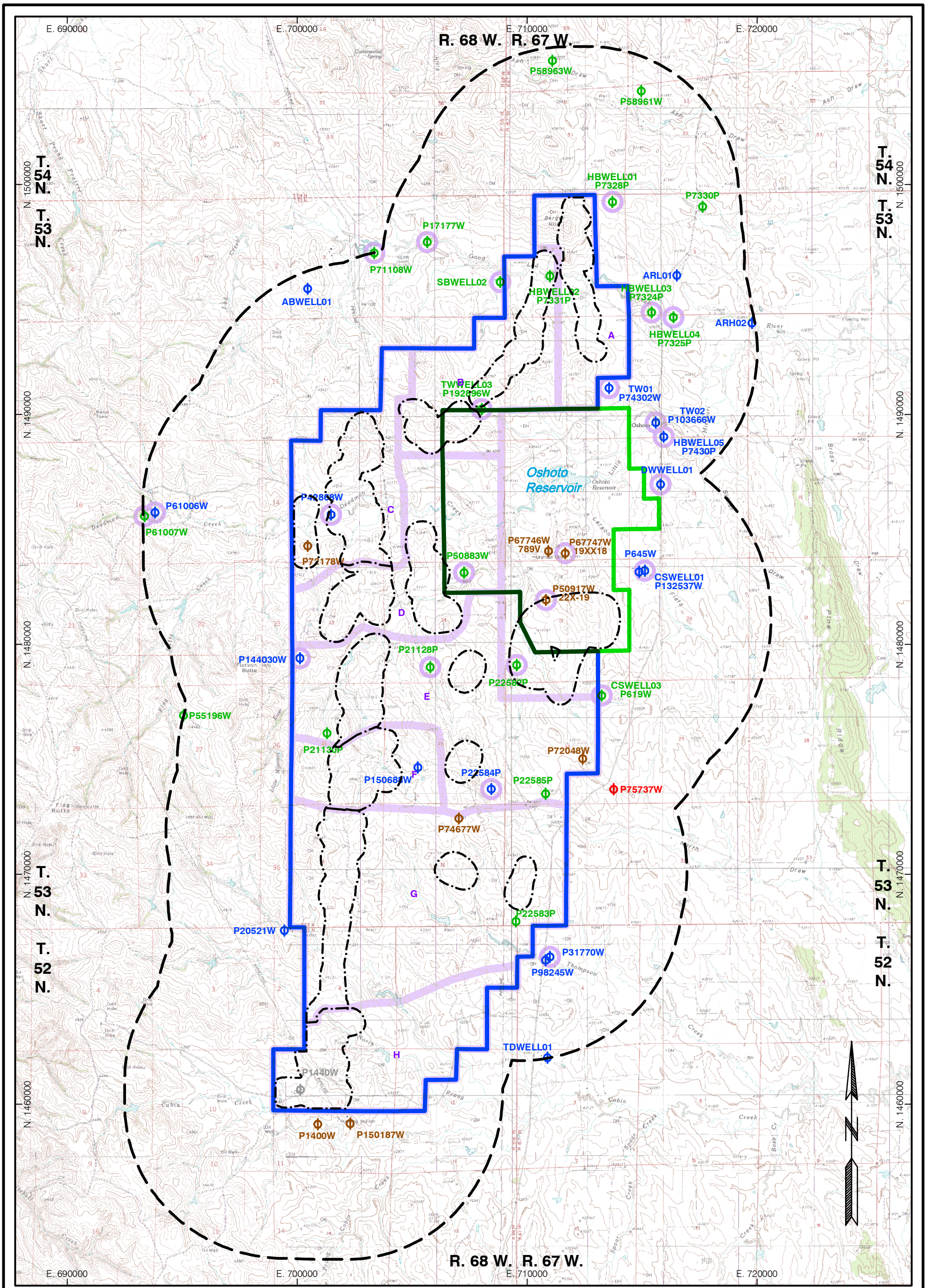


Figure 6.1-1. Potential Operational Surface Water Monitoring Network.



LEGEND

- ROSS LICENSE NO. SUA-1601 BOUNDARY
- PROPOSED KENDRICK EXPANSION AREA BOUNDARY
- POTENTIAL PERIMETER MONITOR WELL RING
- TWO-KILOMETER BUFFER FROM POTENTIAL PERIMETER MONITOR WELL RING
- POTENTIAL MINE UNIT BOUNDARY
- F POTENTIAL MINE UNIT I.D.
- P1440W WATER SUPPLY WELL - STATUS UNKNOWN
- P72048W WATER SUPPLY WELL - INDUSTRIAL
- P150688W WATER SUPPLY WELL - DOMESTIC
- P22582P WATER SUPPLY WELL - STOCK
- P75737W WATER SUPPLY WELL - MISCELLANEOUS
- WATER SUPPLY WELL - MONITORED IN ROSS

STRATA ENERGY INC
A WHOLLY-OWNED SUBSIDIARY OF PENINSULA ENERGY LIMITED

ROSS ISR PROJECT
CROOK COUNTY, WY
LICENSE NO. SUA-1601
P.O. BOX 2318, 1900 W WARLOW UNIT A
GILLETTE, WY 82717

REVISIONS	
Date	Description

KENDRICK EXPANSION AREA
ENVIRONMENTAL REPORT
FIGURE 6.1-2

POTENTIAL OPERATIONAL EXISTING WATER SUPPLY WELL MONITORING NETWORK

Drawn By: MBM
Checked By: BJS
Date: 3/18/15
FILE: KPA1_GW_SAMPLE_OPERATIONAL

WWC ENGINEERING
www.wwcengineering.com

K:\Sheridan\Strata\12145_ACAD_WY83E\DWGS_NRC\KPA1_GW_SAMPLE_OPERATIONAL.dwg 3/18/2015 9:45:38 AM mal mcgill

6.2 Physiochemical Monitoring

The following sections provide an overview of Strata's proposed physiochemical monitoring program. In general the monitoring program will establish pre-operational background conditions for operation, aquifer restoration and decommissioning and identify unintended or unexpected events (excursions or leaks/spills).

The monitoring program described below is based on potential impacts presented in Chapter 4 of this ER and mitigation measures described in Chapter 5 of this ER. Additionally, the physiochemical monitoring will be completed in conjunction with radiological monitoring activities discussed in Section 6.1 of this ER.

6.2.1 Surface Water Monitoring

Surface water monitoring will focus on those surface water features that might be impacted due to a spill or pipeline leak. Given the depth of ISR operations, no direct impacts to the surface hydrology are anticipated. The surface water monitoring stations identified in Section 6.1.3.1 of this ER will be operated from April through October and will measure flow. In addition, the stations will be designed to collect samples during significant runoff events. Quarterly sampling (as available) at grab station sites and reservoirs will be initiated following uranium production in the drainage of the site. Surface water samples will be analyzed for field parameters (pH, conductivity and temperature) and radiological constituents described in Section 6.1.3.1 of this ER. If a significant leak at the surface or from a pipeline occurs, appropriate sampling and reporting will be conducted to determine whether surface hydrological elements have been impacted.

Surface Discharges

Strata will permit all discharges to surface water through the WDEQ/WQD WYPDES program. Monitoring will be completed in accordance with permit requirements and samples will be analyzed for constituents identified in the permit. WYPDES permits will include a temporary WYPDES permit for well testing and construction water and one or more storm water WYPDES permits.

6.2.2 Groundwater Monitoring

6.2.2.1 Pre-Operational Background Groundwater Quality

In accordance with LC 11.3 of SUA-1601, Strata will establish background water quality for the ore zone, overlying and underlying intervals prior to injection of lixiviant in a wellfield. In addition, background water quality will be collected from the shallow interval monitor wells for wellfields located in an area in which the uppermost aquifer is comprised of saturated unconsolidated alluvium in accordance with LC 11.5 of SUA-1601. The data will be used to establish groundwater protection standards and excursion upper control limits (UCLs). Samples will be collected from the following:

- Production and injection wells at a density of one production or injection well per 4 acres of wellfield production area, or, at a density of one production or injection well per 2 acres of wellfield production area if the initial wellfield package for the Ross ISR Project indicates a high level of heterogeneity in the OZ aquifer water quality. If a wellfield production area is sufficiently isolated from the other wellfield production areas in the Wellfield, a minimum of two wells,
- All perimeter monitoring wells that will be used for the excursion monitoring program (LC 11.3(B) of SUA-1601), and
- All monitoring wells in the first overlying and first underlying aquifer at a minimum density of one well per 4 acres of wellfield (LC 11.3(D) of SUA-1601).

Four samples, separated by at least 14 days, will be collected from each well and analyzed for the parameters listed in KEA TR Table 5.7-2. The third and fourth sample may be analyzed for a reduced list of parameters if the first and second sample results are below the minimum analytical detection limits (MDLs) in accordance with LC 11.3(D) of SUA-1601. Background water quality will be established according to procedures in LC 11.3(E) of SUA-1601 or using EPA's ProUCL software.

Prior to conducting principal activities in a new wellfield, Strata will submit a wellfield package to the NRC staff. The initial wellfield package will be submitted to NRC for review and verification in accordance with LC 10.13 of SUA-1601. Each wellfield package will include documentation on the monitor well locations and completion intervals and the pre-operational background

water quality results used to establish groundwater protection standards and UCLs for the wellfield.

6.2.2.2 Existing Water Supply Well Monitoring

Existing water supply wells will be monitored as described in Section 6.1.3.2 of this ER.

6.2.2.3 Excursion Monitoring and Upper Control Limits

During operation and aquifer restoration, excursion monitoring wells will be sampled on a semi-monthly basis to detect potential excursions. Pursuant to LC 11.4 of SUA-1601, excursion parameters and UCLs will be established for each wellfield based on water quality data collected from the ore zone, overlying and underlying aquifers, as previously discussed. LC 11.4 of SUA-1601 specifies that the default excursion parameters in the ore zone and overlying aquifer are chloride, conductivity and total alkalinity. The default excursion parameters for the underlying aquifer specified in LC 11.4 are sulfate, electrical conductivity (EC), and total alkalinity. The suitability of these excursion parameters cannot currently be evaluated in the proposed KEA due to the lack of DM interval baseline water quality data as discussed in Section 3.4.3.4.1.1 of this ER. However, EC measurements in the DM interval during well development are very similar to those observed in the Ross DM wells, indicating these intervals will have similar water quality on a gross salinity basis. A discussion comparing the Ross DM interval water quality with field water quality collected during well development of the KEA DM wells is included in Section 3.4.3.4.1.2. The excursion parameters for the KEA will be confirmed in the wellfield package for each mine unit. UCLs will be calculated according to the procedures in LC 11.4 of SUA-1601.

An excursion is defined in LC 11.5 of SUA-1601 as the exceedance of UCLs for two or more excursion indicators or one excursion indicator exceeding its UCL by 20 percent in a monitor well. If one of these excursion criteria are exceeded Strata will resample the well within 48 hours after the results of the first analysis are received. If the verification sample does not confirm that an excursion has occurred, a third sample will be collected within 48 hours after the verification samples results are received. If the third sample does not show that the excursion criteria are exceeded, then the first sample is considered in error. If the verification or third sample confirms that excursion criteria are

exceeded, the well will be placed on excursion status. Strata will contact the NRC Project Manager by telephone or email within 24 hours of verification, and mail a written notice within 7 days in accordance with LC 9.3 of SUA-1601. Additionally, a written report will be submitted to NRC staff within 60 days of the excursion confirmation and will describe the excursion event, corrective action and results. Excursion corrective actions are described in Section 5.7.8.2 of the Ross TR.

6.2.2.4 Aquifer Restoration Monitoring

Monitoring associated with aquifer restoration will be completed in two phases: active restoration and stability monitoring. During active restoration Strata will monitor the wells used to define pre-operational background groundwater quality in accordance with LC 11.3 of SUA-1601. The results will be compared to the groundwater restoration standards established in accordance with LC 10.6 of SUA-1601.

Stability monitoring will be conducted according to the procedures in Section 6.1.2.5 of the Ross TR. These procedures currently include collecting eight samples over a 12-month period from the wells used to define pre-operational background groundwater quality in accordance with LC 11.3 of SUA-1601. In accordance with LC 10.6 of SUA-1601, stability monitoring will continue until the data show, for all parameters monitored, no statistically significant increasing trend, which would lead to an exceedance of the relevant standard in 10 CFR Part 40, Appendix A, Criterion 5B(5).

6.2.2.5 Meteorological Monitoring

Strata will continue to operate the Ross meteorological monitoring station as required by LC 12.13 of SUA-1601.

6.3 Ecological Monitoring

6.3.1 Vegetation

As described in Section 3.5.4.1 of this ER, Strata conducted baseline vegetation sampling for the proposed KEA using methods approved by WDEQ/LQD. Vegetation community-type mapping was initiated in between 2009 and 2013 using NAIP photography, with actual surveys conducted in 2013.

Strata will commence site reclamation activities, including D&D of the wellfield modules, module buildings, booster pump stations, piping, and the surrounding land areas with the ultimate goal of releasing the proposed KEA for unrestricted (i.e., any) release. Disturbed areas will be reclaimed in compliance with applicable regulations following the completion of construction activities or during decommissioning. A detailed reclamation plan is found in Chapter 6 and Addendum 6.1-A of the approved Ross TR.

The extended reference area concept, as defined in WDEQ/LQD Guideline No. 2, will be used to evaluate the success of revegetation. The extended reference area means all of the undisturbed portions of a vegetation type which has experienced disturbance in any phase of the ISR process. At the end of decommissioning, quantitative vegetation data for extended reference areas representing each disturbed vegetation type will be compared directly by statistical analysis to quantitative vegetative data from reclaimed vegetation types. WDEQ/LQD requires a confidence level of 80% with no mathematical adjustments for climatic change. Qualitative comparisons between extended reference areas and reclaimed areas will also be required for each disturbed vegetation type. WDEQ/LQD will be consulted when choosing the extended reference area and when selecting the standard procedures for qualitative comparisons. Prior to release of the WDEQ/LQD reclamation bond, Strata will demonstrate revegetation success through quantitative and qualitative comparisons between external reference areas and reclaimed areas for each disturbed vegetation type. Monitoring of revegetated areas prior to final WDEQ/LQD reclamation bond release will be conducted using a schedule approved by WDEQ/LQD. The minimum bond release period recommended by WDEQ/LQD for non-coal mines (which includes uranium ISR facilities) is 5 years. Visual assessments of reclamation will be conducted to evaluate

vegetation establishment prior to the final monitoring required for WDEQ/LQD reclamation bond release.

6.3.2 Wildlife

Strata completed baseline monitoring in 2013 for a variety of wildlife species for the proposed KEA, as described in Section 3.5.4.2 of this ER. Those efforts will transition to annual monitoring during the life of the Proposed Action. Wildlife monitoring surveys will be developed according to current WGFD and USFWS protocols and guidelines. The surveys may include the following, as modified for site-specific habitats:

1. Early spring surveys for, and monitoring of, sage-grouse leks within one mile of the license/permit area, new and/or occupied raptor territories and/or nests and T&E and BLM sensitive species on and within the license/permit area;

2. Late spring and summer surveys for raptor production at occupied nests, and opportunistic observations of all wildlife species, including T&E and BLM sensitive species, and other species of management concern; and

3. Other surveys as required by regulating agencies.

No crucial big game habitats or migration corridors are recognized by the WGFD in the proposed KEA or surrounding 1-mile perimeter. Crucial range is defined as any particular seasonal range or habitat component that has been documented as the determining factor in a population's ability to maintain and reproduce itself at a certain level. Due to the lack of crucial big game habitats, WGFD did not require big game surveys during baseline wildlife surveys. Long-term monitoring requirements for big game are not anticipated. A similar approach has been applied to other baseline projects (uranium, coal, and bentonite) in Wyoming, and is the current policy for annual monitoring at surface mines in the region.

6.4 Quality Assurance Program

In accordance with LC 12.10 of SUA-1601, Strata will submit a quality assurance plan (QAP) to NRC staff for review and verification at least 60 days prior to the pre-operational inspection of the Ross ISR Project. The QAP will fulfill the requirements in 10 CFR § 20.1703(c)(4)(vii) and be consistent with the recommendations contained in NRC Regulatory Guide 4.15. The QAP will be modified, as necessary, to include the proposed KEA.

6.5 Historic and Cultural Resources Monitoring

The unanticipated Discovery Plan SOP (Strata 2013) implemented prior to construction at the Ross ISR Project provides for the training of personnel to properly identify previously unknown historic resources. The training will be conducted for all Strata site supervisors that have responsibility for activities that may result in the discovery of previously unknown historic resources. The SOP provides procedures for the discovery, protection, evaluation and reporting of any previously unknown historic resources discovered during maintenance or construction.

6.6 References

NRC (U.S. Nuclear Regulatory Commission), 2007, Regulatory Guide 4.15, Quality Assurance for Radiological Monitoring Programs (Inception through Normal Operations to License Termination) – Effluent Streams and the Environment, Nuclear Regulatory Commission Office of Nuclear Regulatory Research, July 2007.

_____, 1993, Regulatory Guide 8.37, ALARA Levels for Effluents from Materials Facilities, Nuclear Regulatory Commission Office of Nuclear Regulatory Research, July 1993.

_____, 1980, Regulatory Guide 4.14, Revision 1, Radiological Effluent and Environmental Monitoring at Uranium Mills, Nuclear Regulatory Commission Office of Standards Development, Washington, D.C., April 1980.

Strata (Strata Energy, Inc.), 2013, Unanticipated Discovery Plan, October 31, 2013. NRC Adams Accession No. ML13309A246.

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7.0 COST-BENEFIT ANALYSIS

As stated in the Ross FSEIS, potential costs include internal costs (those costs borne by the licensee) and external costs (those borne by local public-service providers in response to Project activities). External costs also include non-monetary costs associated with the potential environmental impacts. These non-monetary impacts are discussed in the respective sections of this ER (e.g., Land Use, Transportation, Geology and Soils, etc.). Some monetary costs, such as severance taxes, production taxes and property taxes, are costs to the licensee but are benefits to the local and regional economy. This chapter discusses the monetary costs and benefits of the Proposed Action and No Action Alternative.

7.1 Proposed Action

The Proposed Action would result in extending the duration but not the magnitude of the costs and benefits evaluated for the Ross ISR Project. Both costs and benefits will occur during all phases of the Proposed Action, including construction, operation, aquifer restoration, and decommissioning. The following sections describe how the potential impacts evaluated for the Ross ISR Project would be extended.

Strata has evaluated the costs and the benefits associated with uranium production in order to formulate the Ross ISR Project and the addition of the proposed KEA. Although the amount of yellowcake produced will depend on the market price and the cost of production, Strata anticipates producing about 750,000 pounds of U_3O_8 per year for 4 to 8 years at the Ross ISR Project. As described in Section 4.10 of this ER, the Proposed Action would enable production of an estimated 8.8 million additional pounds of U_3O_8 over approximately 9 to 11 additional years of production. Under the Proposed Action the duration of wellfield construction is anticipated to increase by approximately 8 to 10 years. The duration of the aquifer restoration and decommissioning phases will be extended by approximately 8 to 10 years under the Proposed Action.

7.1.1 Potential Construction Benefits and Costs

As discussed in Section 4.10.1.1 of this ER, construction activities for the Proposed Action will be limited to additional wellfields and associated

access roads, module buildings, booster pump stations, pipelines, and utilities. Construction activities will be completed by a wellfield crew of approximately 25 people, which will carry over from the Ross ISR Project. Since construction of new wellfields in the proposed KEA will be completed after the Ross ISR Project facilities are complete, the total number of employees during construction under the Proposed Action will be less than the 200 employees projected for initial construction of the Ross ISR Project facilities. Potential impacts of this level of employment on the area's labor force will continue to be SMALL. Ongoing construction costs of new wellfields will be a continuing portion of total operating costs, and extend the duration of wellfield construction by approximately 8 to 10 years under the Proposed Action.

Because the Proposed Action will extend employment levels associated with wellfield construction by approximately 8 to 10 years, but will not entail increases or decreases in employment levels, the Proposed Action will not involve external costs such as housing, education, or health care facilities.

7.1.2 Potential Operation Benefits and Costs

During the operation phase of the Ross ISR Project, Strata estimated a workforce (employees and contractors) of 60 people, with an operation phase planned to take place over a 4- to 8-year period, depending on market conditions. The Proposed Action is projected to extend the duration of the operation phase by 9 to 11 years. The operations phase would benefit the local economy by maintaining about 60 relatively high-paying jobs, with their associated payroll, sales, use and personal property taxes for an additional 9 to 11 years. On an annual basis, the magnitude of these benefits would not change, but their duration would be extended by the Proposed Action.

As described in Section 4.10.1.2 of this ER, tax revenues would continue to benefit Crook County and the State of Wyoming during operations. The majority of these taxes are based on pounds of mineral produced and sold, including severance taxes, State royalties, and production taxes. Estimated major tax revenues from the Proposed Action are shown in Table 4.10.1 of this ER.

Because the Proposed Action will extend employment levels at the Ross ISR Project by about 9 to 11 years but will not increase or decrease employment levels, the Proposed Action will not involve external costs for housing, education or health care services.

Income taxes are not considered in this analysis since there is no state income tax in Wyoming, income taxes are difficult to estimate because they are based on operating profits which are variable and hard to predict, and they accrue to the federal government and do not represent a direct benefit to the local or regional economy.

7.1.3 Potential Aquifer Restoration Benefits and Costs

The employment level would be reduced by about two-thirds after uranium recovery operations are completed and the only remaining activities are aquifer restoration and surface reclamation/decommissioning. Payroll and payroll taxes would decrease accordingly. If market conditions are favorable and additional reserves are identified, the life of the facility as well as the tax and payroll benefits could be extended.

The impacts of the aquifer restoration phase of the operation would not change by the Proposed Action but they would be delayed by about 8 to 10 years during the productive life of the proposed KEA wellfields.

7.1.4 Potential Decommissioning Benefits and Costs

During decommissioning, the workforce requirement will be similar to that required for construction. Under the Proposed Action, the potential impacts of decommissioning would be the same as for the Ross ISR Project, but this project phase would be delayed by about 8 to 10 years.

The estimated decommissioning costs for the Ross ISR Project will be included in the annual financial assurance update submitted to WDEQ/LQD and the NRC for approval prior to construction activities. Each year, the cost estimate will be reviewed by the regulatory authorities based on total remaining aquifer restoration and decommissioning work, and adjustments will be made as necessary.

7.2 No Action Alternative

Under the No Action Alternative, the production and property taxes identified above for the Proposed Action would not be realized by the State and local governments. The uranium ore within the proposed KEA would remain in the ground and thus could be developed at a later date, but consideration of that alternative is not within the scope of this analysis.

The employment, and associated personal income and payroll taxes identified in the previous section, would not be extended under the No Action Alternative. It is possible that other jobs will be created in the region, but that speculation is not within the scope of this report. The lands within the proposed KEA have historically been used for rangeland agriculture, limited hunting, and limited oil and gas development. No other potential uses for this property have been identified to date, so it is considered likely that these historic uses will continue to prevail if the proposed KEA wellfields and associated infrastructure are constructed.

7.3 Benefit Cost Summary

The benefit-cost summary for a fuel-cycle facility such as the Ross ISR Project and the Proposed Action involves comparing the societal benefit of a reliable domestic U_3O_8 supply, which will be used to provide energy, against possible local environmental costs, for some of which there may be no directly related compensation. For this project, there are basically three of these potentially uncompensated environmental costs:

- groundwater impact;
- radiological impact; and
- disturbance of the land.

The groundwater impact is considered to be temporary in nature, as aquifer restoration activities will restore the groundwater to groundwater protection standards as required by 10 CFR Part 40, Appendix A, Criterion 5B(5) pursuant to LC 10.6 of SUA-1601. The annual use of groundwater will not change by the Proposed Action, but the duration of this use will be extended by about 8 to 10 years.

The potential radiological impacts of the Proposed Action are small, with all AEA-regulated wastes being disposed in Class I deep disposal wells within the Ross ISR Project or transported and disposed at a site that is authorized by NRC or an NRC-Agreement State in accordance with LC 9.9 of SUA-1601. Radiological impacts to air and water are also expected to be small.

The disturbance of the land for an ISR facility is quite small, both in terms of total area disturbed and magnitude of topographic changes, especially when compared with conventional surface mining techniques. All of the disturbed land will be reclaimed after the project is decommissioned and will

become available and suitable for pre-construction uses. The annual area affected under the Proposed Action will not change, but the total cumulative area affected will increase as old wellfields are reclaimed and new wellfields are constructed and brought on line over a 9 to 11-year extension period.

In considering the energy value of the U_3O_8 produced to U.S. energy needs, the economic benefit to Crook County, the minimal radiological impacts, minimal and temporary disturbance of land, and technical feasibility of mitigating all other impacts, it is believed that the overall benefit cost balance for the Proposed Action is favorable, and that issuing a license amendment for the proposed KEA is the appropriate regulatory action.

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8.0 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Chapter 1 of this ER explains the purpose and need for the Proposed Action. Chapter 2 of this ER describes the alternatives and describes the Proposed Action in detail. The baseline environment of the proposed KEA and the surrounding area is described in Chapter 3 of this ER. Chapter 4 of this ER describes the potential environmental impacts, both adverse and positive, of the Proposed Action. Chapter 5 of this ER discusses Strata's mitigation plans to reduce or avoid the potential environmental impacts. Chapter 6 of this ER describes the monitoring program that will be carried out by Strata, and Chapter 7 of this ER presents a discussion of the benefits and costs of the Proposed Action. This chapter presents a brief summary of the environmental consequences of the Proposed Action.

Due to the benign nature of ISR uranium recovery methods and the lack of unique environmental resources in the area, the potential environmental impacts of the Proposed Action are minor and similar to or less than those described in the Ross ER and evaluated in the Ross FSEIS. Because of the relatively short duration of the project (extending the Ross ISR Project approximately 8 to 12 years from construction through decommissioning), all environmental impacts are short-term. After the short-term use of the Proposed Action to recover dissolved uranium from the groundwater, the proposed KEA will be restored to its pre-construction condition and will support all pre-construction uses of the land for the foreseeable future. Because of the remoteness of the site, the small magnitude of potential environmental consequences, and the small number of employees required relative to the local labor force, none of the environmental consequences of the project are cumulative with any other ongoing projects in the area.

This chapter summarizes the relatively few environmental impacts that cannot be avoided. These impacts are small, but they could alter the environment of the proposed KEA for a short period of time. The unavoidable impacts of the proposed construction, operation, aquifer restoration and decommissioning of the Proposed Action are summarized in Table 8-1.

Table 8-1. Summary of Environmental Consequences

Potential Impact	Alternative	Potential Impacts
Potential Land Surface Impacts	Proposed Action	Surface disturbance on about 1,050 acres, or about 13% of proposed KEA. Disturbance will range from short term for construction of well pads and utility corridors that will be reclaimed after construction to long term for roads that will remain until final D&D. All disturbed areas will be reclaimed to be suitable for pre-construction uses after aquifer restoration and D&D.
	No Action	None
	Satellite Facility	Surface disturbance would be more than the proposed KEA due to the construction of a satellite processing facility, lined retention pond(s), and deep disposal well(s). All disturbed areas would be reclaimed to be suitable for pre-construction uses after aquifer restoration and D&D.
Potential Land Use Impacts	Proposed Action	Restricted access on up to 882 acres for 12-15 years (construction through decommissioning), which will have small impacts on livestock grazing and hunting. Strata will work with oil production companies to ensure that there are no impacts to oil production.
	No Action	None
	Satellite Facility	Additional land use restrictions would be associated with the satellite facility, lined retention pond(s), and deep disposal well(s).
Potential Transportation Impacts	Proposed Action	The Proposed Action would extend but not increase in magnitude the Ross ISR Project transportation impacts. Some roads might remain after decommissioning if they support the post-decommissioning land use and are desired by the surface owner.
	No Action	None
	Satellite Facility	Additional transportation impacts would result from resin and chemical shipments to and from the satellite facility.

Table 8-1. Summary of Environmental Consequences (cont.)

Potential Impact	Alternative	Potential Impacts
Potential Geology and Soils Impacts	Proposed Action	No significant impacts on geology. About 1,050 acres will be stripped of topsoil for construction of wellfields, module buildings, booster pump stations, pipelines, and access roads. Topsoil will be stockpiled and protected from erosion until it is replaced during reclamation. After topsoil is replaced and revegetated, the land will support the pre-construction uses.
	No Action	None
	Satellite Facility	Topsoil and subsoil disturbance would be greater than the Proposed Action due to the construction of a satellite facility, lined retention pond(s), and deep disposal well(s). After topsoil is replaced and revegetated, the land will support the pre-construction uses.
Potential Surface Water Impacts	Proposed Action	Small risk of increased sediment load to ephemeral stream channels due to surface disturbance. Small risk of chemical or fuel spills during project life. Risks minimized by applying BMPs.
	No Action	None
	Satellite Facility	Potential for increased sediment since surface disturbance would be greater than the Proposed Action due to the construction of a satellite facility, lined retention pond(s), and deep disposal well(s).
Potential Groundwater Impacts	Proposed Action	Small risk that adjacent aquifers could be contaminated by excursion of recovery solution, which would require cleanup. Small risk that shallow groundwater could be contaminated by leaks or spills. Small net withdrawal of water from the ore zone aquifer during operation and aquifer restoration to maintain inward hydraulic gradient, which represents a consumptive use. Water consumed will be replaced by natural recharge over time.
	No Action	None
	Satellite Facility	Similar to the Proposed Action, except that lined retention pond(s) and the deep disposal well(s) will have the potential to impact groundwater.
Potential Ecological Impacts	Proposed Action	No threatened or endangered species will be impacted. No critical game habitat will be impacted. Small, temporary loss of habitat for some species will occur for life of project.
	No Action	None
	Satellite Facility	Similar to the Proposed Action with added potential to impact waterfowl and other wildlife due to lined retention pond(s). BMPs would limit risks.

Table 8-1. Summary of Environmental Consequences (cont.)

Potential Impact	Alternative	Potential Impacts
Potential Air Quality Impacts	Proposed Action	Slight increases in fugitive dust will occur, mostly during construction. Fugitive dust will increase over baseline levels for life of project due to increased traffic over local road system. No violation of air quality standards will result. Combustion and greenhouse gas emissions have been estimated and will be relatively low. Greenhouse gas emissions will be offset by the power generated from the recovered uranium.
	No Action	None
	Satellite Facility	Same as Proposed Action.
Potential Noise Impacts	Proposed Action	Noise will increase over ambient levels, which are 35 to 45 dBA, over life of project, mostly from construction equipment and vehicles. Nearest residence could experience short-term noise above the 55-dBA "annoyance" threshold if construction occurs near the license boundary at its shortest distance from the residence.
	No Action	None
	Satellite Facility	Similar to the Proposed Action, with added truck traffic for resin and chemical shipments.
Potential Historic and Cultural Impacts	Proposed Action	Sites eligible for NRHP will be avoided, a phased process will be used to identify previously undiscovered cultural resources in accordance with Strata's unanticipated discovery plan (UDP). In addition, LC 9.8 of SUA-1601 includes a stop-work provision if any cultural resources are discovered during construction.
	No Action	None
	Satellite Facility	Same as Proposed Action.
Potential Visual/Scenic Resources Impacts	Proposed Action	Slight visual impacts will occur from new structures and construction equipment but will maintain consistent with BLM visual resource classification of the area.
	No Action	None
	Satellite Facility	Similar to the Proposed Action, except that the satellite facility and lined retention pond(s) would have added, localized visual impacts.

Table 8-1. Summary of Environmental Consequences (cont.)

Potential Impact	Alternative	Potential Impacts
Potential Socioeconomic Impacts	Proposed Action	Continue to have small, positive benefit to the State on severance tax, royalty, and sales and use tax collections and moderate benefits to Crook County on property and production taxes.
	No Action	None
	Satellite Facility	Same as Proposed Action.
Potential Nonradiological Health Impacts	Proposed Action	Slight risk of public exposure through chemical leaks and spills will be mitigated by employing BMPs.
	No Action	None
	Satellite Facility	Similar to the Proposed Action, with added risk of transporting chemicals to the satellite facility.
Potential Radiological Health Impacts	Proposed Action	Modeling shows no impact to the public.
	No Action	None
	Satellite Facility	Similar to Proposed Action, with added potential radon releases from satellite facility and deep disposal well(s).
Potential Waste Management Impacts	Proposed Action	Slight risk of exposure to public by transporting wastes to approved disposal site. Risk will be minimized by employing BMPs.
	No Action	None
	Satellite Facility	Same as Proposed Action.

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